CHAPTER 2 PROPOSED ACTION AND PROJECT ALTERNATIVES

The purpose of this chapter is to present the proposed action and the project alternatives that were considered but eliminated from further consideration. The discussion is divided into four sections; a project overview; detailed descriptions of the project components (transmission line, substations and microwave-telecommunication sites); the other project alternatives that were considered; and construction details (right-of-way, construction activities, disturbances and mitigation).

2.1 PROJECT OVERVIEW

NorthWestern Energy (NorthWestern) proposes to construct, operate and maintain the MSTI 500kV transmission line to address the requests for transmission service from customers and relieve constraints on the high-voltage transmission system in the region. The new transmission line would begin at Townsend Substation which would be constructed in southwestern Montana about five miles south of Townsend, Montana, east of U.S. Highway 287 (US 287) in Broadwater County. The line would proceed south into southeastern Idaho connecting to Idaho Power Company's (IPCO) existing Midpoint Substation, 12 miles northeast of Jerome, Idaho. Figure 1-1 shows the substation locations and the alternative routes being considered.

The major projects components of the proposed action include the 500kV alternating current (AC) transmission line, a new Townsend Substation; construction of a new facility next to the existing Mill Creek Substation near Anaconda, Montana for the installation of a bank of phase shifting transformers and modifications to the existing Midpoint Substation in Idaho. Brief descriptions of the major project components are presented in the following sections.

2.1.1 New 500kV Transmission Line

The MSTI 500kV AC transmission line would interconnect the new Townsend Substation with IPCO's existing Midpoint Substation. The MSTI 500kV transmission line would be between 400 and 430 miles long.

Various alternative route links have been identified as part of the siting study for the transmission line. During the route selection process, some of these alternative route links were combined into a limited number of end-to-end route and subroute alternatives. A preferred route was selected based on environmental and other considerations. Alternative route links, shown in Figure 1-1, cross Silver Bow, Jefferson, Broadwater, Deer Lodge, Beaverhead, and Madison counties in southwestern Montana, and Clark, Jefferson, Blaine, Butte, Bingham, Bonneville Power, Minidoka, Lincoln, and Jerome counties in southeastern Idaho. The links cross private, state (Idaho and Montana) and federal (primarily Bureau of Land Management [BLM] and U.S Forest Service [USFS]) land. There are a total of 1,150 miles of alternative route links, 582 miles in Montana and 568 miles in Idaho.

The MSTI 500kV transmission would be constructed mainly on guyed V steel lattice structures approximately 125 feet high. Less frequently, self-supporting steel lattice structures or self-supporting tubular steel structures approximately 125 feet high would be used. The guyed V structure would be used for most tangent segments of the line. Self-supporting steel lattice structures would be used in mountainous areas and at points where a line changes direction or terminates. Tubular steel monopoles may be used in areas of narrow right-of-way or where permanent land disturbance or the amount of land required for the structure must be minimized (e.g., agricultural land, developed and urban land, and some river and perennial stream crossings). The land permanently required for the structures would vary depending on structure type and terrain, ranging from 100 square feet for steel monopoles to 22,500 square feet for the guyed V structures. An area of approximately 200 by 200 feet (0.9 acre) per structure may be temporarily disturbed during construction.

The required right-of-way width is 220 feet and the average span length between the transmission structures would be approximately 1,400 feet (4 per mile) for the guyed V structures, 1,200 feet (4 per mile) for the self-supporting steel lattice structures, and 900 feet (6 per mile) for the self-supporting tubular steel monopole structures.

Access along the transmission line right-of-way would include using existing improved roads, using existing roads that require improvement, and building new roads in flat, sloping, steep, or very steep terrain. Permanent new roads would be graded to a travel service width of 14 feet.

In addition, during construction of the transmission line there would be temporary pulling and tensioning sites, material staging sites, and concrete batch plants.

A detailed description of the transmission line is provided in Section 2.3.2.1.

2.1.2 New Townsend Substation

The new Townsend 500kV substation would be located in southwestern Montana, five miles south of Townsend, Montana, east of US 287 in Broadwater County, Montana. The current land use of the site is center-pivot irrigation. The parcel contains agricultural outbuildings and a residence, located about 1,030-feet south of the substation site. Adjacent land use is a mixture of center-pivot irrigation and pasture. The total size of the Townsend Substation site would be approximately 52 acres. A detailed discussion of the new Townsend Substation is provided in Section 2.3.2.2.

2.1.3 Mill Creek Substation

A new facility would be built adjacent to NorthWestern’s existing Mill Creek Substation, located approximately three miles south of Anaconda, Montana. The proposed facility would be built to accommodate a bank of phase shifting transformers and other series capacitor banks and associated substation equipment. The MSTI 500kV line would not connect directly to or require modification of the existing substation. Engineering studies will be completed to determine the final layout of this new facility.

2.1.4 Midpoint Substation Modifications

IPCO’s existing Midpoint Substation located 10 miles north of Interstate 84 (I-84) in Jerome County, Idaho would be modified to accommodate the new MSTI 500kV transmission line. Engineering studies with IPCO will be completed to determine the ultimate modifications required at the Midpoint substation.

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

Several alternatives to the proposed action were considered but eliminated from further study because they would not meet the purpose and need for the project. These alternatives included: alternative transmission technologies, underground construction, non-transmission alternatives, and other routing alternatives.

2.2.1 ALTERNATIVE TRANSMISSION TECHNOLOGIES

2.2.1.1 Lower Voltage Transmission Lines

The maximum voltage used for major AC transmission lines throughout the western electrical system is 500kV. NorthWestern considered the possibility of using lower voltage lines (e.g. 230kV and 345kV) to meet the purpose and need identified for this Project as explained in Chapter 1. However for power delivery levels required for the MSTI project (1,500 MW rating objective), higher voltages provide performance benefits over lower voltages. Higher voltage lines provide increased power transfer capability and significant improvements in power delivery efficiency. NorthWestern currently has 639 MW of transmission service requests (TSRs) and 3,400 MW of new generation interconnect applications in study mode. The capacity of a 230kV line is around 478 MW depending on design and operating conditions, which is insufficient for the existing TSRs. A 345kV line can carry up to 700 MW, depending on design and operating conditions, which would leave very little capacity to address the 3,400 MW of proposed new generation in Montana.

Two key measures of transmission line performance that depend heavily on the voltage level are surge impedance loading capability and conductor losses.

The conductor losses are significantly less at higher transmission voltages resulting in more efficient and economic power system operation. These losses are a measure of the energy consumed by the current flowing against the resistance of the conductor that causes internal heating of the wire. These are real energy losses that must be replaced by running additional generation elsewhere on the system. The increase in losses can amount to a substantial penalty with lower voltage alternatives.

Surge impedance loading capability or SIL is another useful index for determining the amount of power that can be transferred over a transmission line without adversely impacting system performance. For the most part SIL is a function of the line voltage and conductor geometry. If the level of power flow on a line exceeds its SIL, system voltage degradation and electrical stability problems can occur unless supplemental voltage support apparatus is installed to compensate for this condition. Even without supplemental voltage support, a typical 500kV transmission line operating at its SIL, can efficiently carry three to four times more power than a typical 230kV transmission line. However, a 230kV or 345kV alternative to the Project would not be an efficient design given the electrical transfer capacity needed. A typical 230kV or 345kV alternative would increase the supplemental reactive power needs and result on a 400 to 500 percent increase in system losses. Furthermore, 230kV and 345kV voltages would require similar transmission structures to the 500kV voltage and have comparable right-of-way requirements and environmental impacts. Lastly, voltages lower than 500kV were eliminated from further consideration because lower voltages would require many more lines to transmit the same amount of electric power as the proposed 500kV line. Numerous lower voltage lines would result in compounded environmental and social impacts.

2.2.1.2 Higher Voltage Transmission Lines

The only commercially viable transmission systems in existence in the world today with voltages higher that that proposed for the MSTI project are 765kV lines. There are some 765kV lines operating in the eastern United States (U.S.) and in Europe; however there are no 765kV transmission lines in the western U.S. The backbone transmission system in the western U.S. is 500kV. Construction of a 765kV line would be significantly more costly and would not integrate with the existing or planned electric system in the region. In addition, voltage levels higher the 500kV would not result in higher capacities without significant facility additions to the existing system. A 765kV voltage is impractical as an alternative voltage for the MSTI project.

2.2.1.3 Direct Current (DC) Transmission

An AC system was selected because it would allow NorthWestern more flexibility to connect to the existing transmission system and planned expansions of the western regional grid. Direct Current (DC) terminal installations (e.g., converter stations that convert AC to DC and DC to AC) are more expensive for lines less than 500 miles in length and there would be considerable difficulty and expense to connect the DC system to intermediate AC buses in the future.

The primary benefit of a DC transmission line system is greater control of power flows over long distances. However, this benefit would not justify the considerable increase in project cost. The integration of regional resources (existing and future generation or transmission systems) through interconnection is one of the primary reasons for supporting the purpose of this project.

DC is found in a few instances in the western U.S., but AC is the standard for the backbone transmission system in the western U.S. DC is only feasible, because of the high cost of terminals, when a line is very long (typically 500 miles or more) and when power is sent point to point with no intermediate stations. For this project DC transmission would cost 4 to 5 times more than the proposed 500kV AC transmission line. Also, DC is more difficult to integrate into the western system.

2.2.2 UNDERGROUND CONSTRUCTION

Underground construction and installation of 500kV cable for a line of this length is not reasonable or feasible from an economical, technical and environmental impact standpoint and was therefore eliminated from further consideration.

Technology is advancing and more underground electric lines are being constructed around the world, but these are typically of lower voltages. For example, 69kV lines are often undergrounded despite the higher cost, and distribution lines are routinely undergrounded in urban areas. Higher voltages greater than 69kV are typically overhead.

Design, manufacture, installation and operation of long-distance 500kV AC underground transmission lines is still in the research and development stages and reliability issues for long term operation remain unresolved. Current underground cable systems above 400kV are primarily located overseas in Japan, Europe and the Far East, and mostly consist of self-contained fluid filled (SCFF) high voltage cable systems. SCFF high voltage underground cable systems use paper insulated or laminated polypropylene paper insulation. Newer cable technology uses a high-voltage extruded dielectric insulation of cross-linked polyethylene (XLPE). Applications of 500kV XPLE are minimal to date and limited to short term transmission lines. Very few 500kV XLPE and SCFF underground cable systems have been installed and are operating in the world, and only one short length of SCFF installation occurs in the U.S. The longest installation of 500kV underground XLPE cable is in Tokyo, Japan. This project is approximately 25 miles long and has extruded splices.

High voltage underground transmission lines have markedly different technological requirements than lower voltage underground distribution lines. Underground high voltage transmission lines require extensive cooling systems to dissipate the heat generated by the transmission of bulk electricity. The extremely high cost of large cooling systems and other special design requirements prohibits the application of underground transmission systems for long distance electric transmission.

In addition, the basic cost of an underground a high voltage transmission line would be many times more expensive than the cost of overhead construction. Depending on topography, costs for an underground lower voltage (69kV to 138kV) cable construction typically range from four to six times greater than construction of overhead lines. Actual costs of installed 500kV underground cable systems indicate that the costs could be in the range of 10 to 20 times as much as overhead 500kV.

Underground systems would require a pipeline and above-ground ancillary facilities (e.g., oil-pressurizing and pumping stations, cooling stations) to transport cooling oil along the transmission line. Oil-pumping and cooling facilities would be required approximately every 7 to 10 miles along the transmission route and at the originating and terminating substations. In addition to the oil-pumping and cooling facilities every 7 to 10 miles, above ground substation facilities would be required at these same intervals for reactor installation and other voltage control devices.

While underground transmission lines are relatively immune to weather conditions, they are vulnerable to washouts, seismic events, cooling system failures, and incidental excavation. Other possible causes for cable failure include water intrusion into the cable, overheating of the cable, high voltage transients, thermal movement during load cycling and aging of the cable. The repair of high-voltage underground cable systems has relatively long outage times compared to repairs of traditional overhead lines. When a fault occurs the circuit is out of service and cannot be placed back into service until repair and test of the system is completed. Because the cable contains a central hollow duct in the conductor that carries cooling dielectric fluid, outage levels can be lengthy until fluid levels are restored. Qualified cable-splicing personnel may be difficult to retain on short notice. It could take at least 5 to 10 days to mobilize qualified technicians and equipment to splice a failed cable. The estimated minimum outage duration for locating, excavating and repairing a single cable failure is estimated to be at least 20 days. Typically, failures in overhead lines can be located and repaired in a matter of hours. Long-term outages would be unacceptable for a circuit carrying bulk power. Further, it is possible that a loss of coolant fluid could occur and result in environmentally hazardous coolant materials contaminating the surrounding soil. A coolant fluid leak can be caused by several means including thermal expansion and contraction of the cable due to power cycling, ground movement, splice breakage, termination movement, improper installation and a cable fault. The fluid is under pressure, so when a leak occurs, it can spread.

During construction, the environmental impacts of an underground transmission line would be similar to those for major pipeline construction. Typical construction would involve extensive ground disturbance; requiring a continuous trench between terminal points. Potentially greater adverse environmental impacts could be expected because the majority of the right-of-way would be disturbed. Whereas, overhead transmission line construction typically would result only in disturbances at individual structure sites, and at the ancillary facilities associated with access to the right-of-way. In addition, overhead construction has the flexibility to span sensitive features, such as wetlands. Underground construction does not have this type of flexibility and would require construction through sensitive features. In agricultural areas, underground construction may be much more disruptive to agricultural or rural land uses than overhead construction. Farming can usually be conducted under overhead lines (with the exception of structure locations), while it would be prohibited over underground lines to provide continual access to the underground cable and to avoid damaging the line during cultivation. Underground transmission rights-of-way require restrictive development and land use easements that prohibit many forms of economical land use.

The principal environmental advantage of undergrounding a transmission line would be the reduction of adverse visual impacts. However, an underground transmission line would still require above-ground ancillary facilities (every 7 to 10 miles) on or adjacent to the right-of-way and would disturb more land area. Replacement or repair activities along underground cables would result in significant ground disturbance when compared to repair of overhead lines. Overhead line repair work usually involves much less impact, typically only at the existing structure locations. In addition to excavations, secondary off-site ground disturbing impacts may occur during repair of underground lines if selective trench backfill is required for heat dissipation of underground cable. Off-site material source sites must be excavated to obtain this select trench backfill material, and then this material must be trucked to the trench site.

The reduction of adverse visual impacts of underground versus overhead transmission does not outweigh the economic and technically impractical options for this project. Underground 500kV availability is not capable of meeting the purpose and need for the project. Because of this, an underground system was not considered a viable alternative, and was eliminated from further consideration.

2.2.3 NON-TRANSMISSION

2.2.3.1 New Generation

Building new generation would not replace the need for the MSTI 500kV line. One of the principal purposes and needs for the MSTI project is to respond to customer requests for additional transmission capacity. The proposed action would provide another needed pathway for the export of existing and proposed electricity generated in Montana to be directed from the north to the south and further relieve the existing and projected congestion in the area. Therefore, any new generation facilities that would be built would not remove the existing transmission system constraints between Montana and Idaho and in fact would aggravate the situation. Not only is new transmission needed to remove existing constraints, but additional new transmission would be needed to accommodate new power generated. Also, construction of any new generation facilities would not be able to accommodate the need for bi directional seasonal and regional energy exchanges because there still would be a lack of adequate transmission capability. For these reasons, this alternative was not considered further.

2.2.3.2 Distributed Generation

Distributed generation is placement of small generators within load pockets in urban areas. Distributed generation is typically less than 5 MW in net generating capacity that is located on distribution feeders near customer load. Examples of distributed generation include fuel cells, micro turbines, photovoltaics, wind, landfill gas, and digester gas. Distributive generation is being done where feasible in major population centers but is not considered an acceptable alternative to the proposed project because distributed generation cannot deliver the amount for new generation capacity, approximately 3,335 MW per year, in the Western Electricity Coordinating Council (WECC).

2.2.3.3 Energy Conservation and Load Management

Energy conservation is the more efficient use of electricity by customers. Conservation incentive programs are designed to reduce energy consumption per customer, providing an increase in energy resources for new loads. Load management refers to power supply system improvements by a utility. Load management programs allow customer demand to be moved away from peak load hours, freeing existing resources to serve additional peak loads. While energy conservation and load management can somewhat reduce the demand for electric energy, they will likely not reduce the load growth to zero, thereby eliminating the need for new generation sources. Therefore energy conservation and load management cannot alone be considered an alternative action to meet the stated need for the project. For this reason this alternative was eliminated from further consideration.

2.2.4 ROUTING ALTERNATIVES ELIMINATED

Routing alternatives that were considered and eliminated are documented in Section 2.7.3 of this document.

2.3 ALTERNATIVES STUDIED IN DETAIL

2.3.1 NO ACTION

Under the no-action alternative, no new transmission facilities would be constructed by NorthWestern between the new Townsend Substation and the Midpoint Substation. Advantages of the no-action alternative would include: the preclusion of associated impacts on the environment from the construction and operation of the MSTI 500kV project and the elimination of financial costs associated with construction and operation of a 500kV transmission line, the new Townsend Substation, construction of the Mill Creek Substation, and the modifications to the existing Midpoint Substation in Idaho. However, the purpose, need, and benefits of the project as explained in Chapter 1, would not be met. Constraints on the transmission of electricity in the region would not be relieved, operational flexibility and reliability would not be improved, and economical power transfers, sales and purchases in the region would not realized.

The consequences of not constructing the MSTI 500kV transmission project would include the following:

1) NorthWestern would not be able to respond to customer requests for transmission capacity. The proposed action would be able to address existing and future requests from customers for capacity by providing up to 1,500 MW of available new capacity.
2) Montana is resource rich in coal, gas, oil, and wind. The Rocky Mountain Area Transmission Study (RMATS) in 2004 recommended an increase to the transfer of capacity in resource rich Montana to demand centers in other regions of the WECC. The proposed action would be instrumental in fulfilling the RMATS recommendation. If the MSTI project is not constructed it would limit the ability to transfer additional low cost energy resources to demand centers in the Intermountain West and Northwest, thereby forgoing the opportunity to significantly strengthen the regional integrated transmission system.
3) In 2005, Congress directed the Department of Energy (DOE) to conduct a nationwide study of electrical transmission congestion of current systems. The study completed in August 2006 identified a range of critical geographic areas that face serious challenges for ensuring reliable and cost effective electric delivery. One of the congested areas was the Montana, Idaho and Northwest Region. The DOE concluded that timely development of integrated generation and transmission projects will occur only if states, regional organizations, Federal agencies and companies collaborate to bring new facilities into existence. The MSTI 500kV project would provide another path out of Montana into Idaho and other areas of the Western Interconnection Region that were identified as congested in the DOE study. Not constructing the MSTI project would mean that some of the historical, current and projected congestion in the Western Interconnection Region would not be alleviated and would remain into the foreseeable future.
4) Building new or upgrading transmission capacity is one way to deal with long-term congestion problems in the region. If the MSTI 500kV Project is not constructed, the ability to help improve WECC transmission system reliability and flexibility, and relieve congestion on existing transmission lines in the region will not occur.
5) NorthWestern's transmission system including export paths was originally designed and constructed along with generation resources in an integrated manner, primarily to meet load serving requirements. The existing transmission system was not designed and cannot accommodate significant new generation interconnection without the addition of the new transmission infrastructure. If the MSTI project is not constructed NorthWestern will not be able to meet the new TSRs and accommodate the more than 3,400 MW of proposed new generation in NorthWestern's generation interconnection queue.
6) If the MSTI project is not constructed there would be the loss of positive economic impacts including the loss of potential tax revenues to local tax districts from project construction and right-of-way purchases, and the loss of job opportunities associated with project construction.
7) No adverse impacts from construction and operation of the project would occur.
8) Financial costs would be eliminated associated with construction and operation of the 500KV transmission line, the new Townsend Substation and the Mill Creek Substation.

2.3.2 PROPOSED ACTION

NorthWestern is proposing to construct, operate and maintain a 500kV AC transmission line from the proposed Townsend Substation in southwestern Montana to the existing, but to be modified, Midpoint Substation in southeastern Idaho. The purpose, need and benefits of the project identified in Chapter 1 would be met by this proposed action.

The design, construction, operation, and maintenance of the MSTI 500kV Project transmission line would meet or exceed the requirements of the National Electrical Safety Code (NESC), U.S. Department of Labor Occupational Safety and Health Standards, and NorthWestern's requirements for safety and protection of landowners and their property.

Various types of structures, foundations, conductors, insulators and associated hardware are being considered for use in the proposed project. Preliminary engineering studies are ongoing to define design criteria and project design specifications. The following sections provide detailed descriptions of the basic design characteristics under consideration for the transmission line, substation facilities and communication system.

2.3.2.1 New 500kV Transmission Line Specifications

The proposed MSTI 500kV transmission line would be an AC transmission line interconnecting other regional AC facilities. A structure selection study of 500kV structure types for the proposed transmission line was performed. Costs, and various aspects and impacts of the different structures were considered. Based on the engineering study, guyed V steel lattice structures are the preferred structure type for the MSTI 500kV project. Due to their higher strength to weight ratio, guyed V steel lattice structures offer a more effective solution to the typical spans and mechanical loadings for higher voltage lines. In some instances, however, self-supporting steel lattice and tubular steel monopoles would be used. These structures are heavier and costlier than the guyed V steel lattice structure, but they do offer solutions for right-of-way constraints. The electrical design characteristics of the 500kV transmission line are summarized in Table 2-1.

Table 2-1 Electrical Design Characteristics of the 500kV AC Transmission Line

General Overview

	Self-Supporting Steel Lattice	**Guyed V Steel Lattice**	**Self-Supporting Steel Tubular**
Line Length	400-430 Miles		
Voltage	500kV		
Maximum Transfer Capacity	1,600 MVA (1500 MW) – *To be determined by the WECC Regional Rating Process*		
Average Structure Height	125 feet *(single circuit)* 185 feet *(double circuit)*	125 feet	120 feet
Average Span Length	1,400 feet *(single circuit)* 1,200 feet *(double circuit)*	1,400 feet	900 feet
Average Number of Structures per Mile	4	4	6
Transmission Line Right-of-Way Width	220 feet	220 feet	220 feet

Land Temporarily Disturbed

	Self-Supporting Steel Lattice	**Guyed V Steel Lattice**	**Self-Supporting Steel Tubular**
Structures	200 x 200 feet (0.9 acres per structure) 3.4 acres/ mile *(single circuit)* 3.9 acres/mile *(double circuit)*	200 x 200 feet (0.9 acres per structure) 3.4 acres per mile	200 x 200 feet (0.9 acres structure) 5.3 acres per mile
Pulling/Tension Sites	200 feet wide x 600 feet long One site required every 3 miles Average of 0.90 acres of disturbance per mile		
Material Staging Sites	400 x 540 feet (5 acres) One site every 40 miles		

Land Temporarily Disturbed (*cont.*)

Concrete Batch Plants	1 acre field batch plant for sections of tubular pole construction in remote areas Ready mix concrete from retail batch plants within 35 mile haul distance Use volumetric concrete trucks where minimal amount of concrete required (See Section 2.5.1.6 for discussion of concrete sources and delivery)

Land Permanently Required

	Self-Supporting Steel Lattice	**Guyed V Steel Lattice**	**Self-Supporting Steel Tubular**
Structures	50 x 50 feet *(single & double circuit)* 2,500 sq ft (0.05 acre) per structure 0.2 acres per mile, assuming 4 structures per mile	150 x 150 feet approximate dimension to guy anchors 22,500 sq ft (0.52 acre) per structure 2.1 acre per mile, assuming 4 structures per mile	10 x 10 feet 100 sq ft (0.002 acre) per structure 0.013 acres per mile, assuming 6 structures per mile

Access Roads	Level 1 - Existing Improved Roads	0.4 acre
Average acres per mile of transmission line by ground disturbance level	Level 2 - Roads That Require Improvement	1.0 acre
	Level 3 - Construct Road In Flat Terrain (0 to 8%)	2.0 acres
	Level 4 - Construct Road In Sloping Terrain (8 to 15%)	2.5 acres
	Level 5 - Construct Road in Steep Terrain (15 to 30 %)	3.4 acres
	Level 6 - Construct Road in Very Steep Terrain (> 30%)	5.0 acres

Circuit Configuration	Single circuit, three conductor bundle per phase with three phases Horizontal configuration
Conductor Size	1,590 thousand circular mil (kcmil) ACSR triple bundle (1.504 inch diameter)
Max Anticipated Electric Field at Edge of Right-of-way	Guyed V and Self-Supporting Steel Lattice: 1.78kV/m Double Circuit Self-Supporting Steel Lattice: 0.50kV/m Self-Supporting Steel Tubular : 0.72kV/m

Land Permanently Required (*cont.*)

	Self-Supporting Steel Lattice	Guyed V Steel Lattice	Self-Supporting Steel Tubular
Max Anticipated Magnetic Field at Edge of Right-of-way	Guyed V and Self-Supporting Steel Lattice: 67.17mG Double Circuit Self-Supporting Steel Lattice: 92.57mG Self-Supporting Steel Tubular : 24.85mG		
NESC Standard for Ground Clearance of Conductor	32 feet minimum at 167 degrees F 35 feet agricultural areas 40 feet highway and river crossings		
Structure Foundations	Augured hole with reinforced concrete pier	Concrete spread footing for masts. Helical anchors for guys	Augured hole with reinforced concrete pier

The following sections describe the transmission line components for the proposed MSTI 500kV Project.

Structures and Foundations

The proposed structure type for the MSTI project is a guyed V-shaped, single-pedestal, lattice structure fabricated from galvanized steel. Guyed V structures have the optimum weight and strength parameters for 500kV line construction. The guyed V structure typically will be used for most tangent segments of the line. Other structure types that would be used where warranted for engineering or economic reasons or to mitigate environmental impacts include: self-supporting steel lattice and self-supporting tubular steel monopole structures. Where the line changes direction or terminates the conductor self-supporting steel lattice structures will be used. This will include angle structures, dead end structures, mitigations structures in mountainous areas and other special situations. For areas where narrow right-of-way or where permanent land disturbance and land required must be minimized, tubular steel monopoles may be used. This includes agricultural land, developed and urban land and in some instances river and perennial stream crossings. Typical structure-to-structure spans would average 1,400 feet for single circuit guyed V steel lattice and self-supporting steel lattice structures and an average of 900 feet for the tubular steel monopole structure type. In areas where double circuiting with existing lines is required the average span length would be 1,200 feet using self-supporting steel lattice structures. The height of the structures would range between 90 and 160 feet, but would average 125 feet. The double circuit self-supporting steel lattice structure would average 170 feet in height. Figure 2-1 shows the types and dimensions of the 500kV structures that would be used. Figure 2-2 contains photographs of the typical 500kV structures.

The area of the base of the structures would vary depending on the structure type and terrain. However, all of the area surrounding the foundations and/or guy anchors would be usable for compatible and permitted uses which are described in the operation, maintenance and abandonment section of this chapter.

The following paragraphs describe the structure types and foundations in more detail.

GUYED V STEEL LATTICE STRUCTURE

The guyed V shaped steel lattice structure, with a horizontal cross arm at the top, would have a single footing for the masts and four down-guy cables. Each cable would be about one inch in diameter. The single foundation for masts would have a reinforced concrete bearing pad six by six feet in plan and one foot in depth. Resting on the bearing pad would be a three by two foot pedestal to support the masts. Depth to the bottom of the bearing pad would vary from four feet to seven feet for typical soils conditions. The foundations for the masts could be either pre-cast or poured in place concrete. The guys are anchored with 15 inch helical screw anchors to depths ranging from ten to twenty feet in depth for typical soil conditions. The principal advantages of the guyed V structure are they are lighter, more flexible, and stronger than their self-supporting counterparts. In addition, they have lower installations costs and can be assembled faster and are easier to replace in case of a line failure.

SELF-SUPPORTING STEEL LATTICE STRUCTURE

Where the line changes direction or terminates the conductor, line tensions increase significantly and self-supporting galvanized steel lattice structures will be required. In addition, this structure type would be used in areas of steep terrain where slopes are greater than the angle of the guy, or in situations where guy cables would extend beyond the edge of the right-of-way. In areas were double circuiting with existing lines is required, the self-supporting steel lattice structure would be used. Also, in areas considered visually sensitive where the line would parallel existing self-supporting structures, less visual contrast would be created if structures similar to the existing ones are used. Self-supporting structures also could be used in other situations such as where a narrower right-of-way would be needed due to terrain constraints. The concrete foundation of each leg would consist of an augured hole with a reinforced cast in place concrete pier 3 to 6 feet in diameter and 12 to 24 feet deep.

TUBULAR STEEL MONOPOLE STRUCTURE

Self-supporting tubular-corten steel (dark, rust like finish) monopole structures may be used as a mitigation structure in areas of narrow right-of-way or where the permanent land disturbance and land required must be minimized such as agricultural land and developed and urban land. The concrete foundation would consist of an augured hole with a reinforced cast in place concrete pier approximately 7 feet in diameter and 24 to 30 feet deep.

DEAD-END STRUCTURE

At certain locations along the transmission line, more robust structures would be needed (1) to add longitudinal strength to the line, (2) at turning points (angles) and (3) for added safety at crossings of other transmission lines. In most cases, the more robust structures would be self-supporting steel lattice structures. A three-pole, guyed or self-supporting, steel-tubular structure design is an alternative structure type for use as dead-ends.

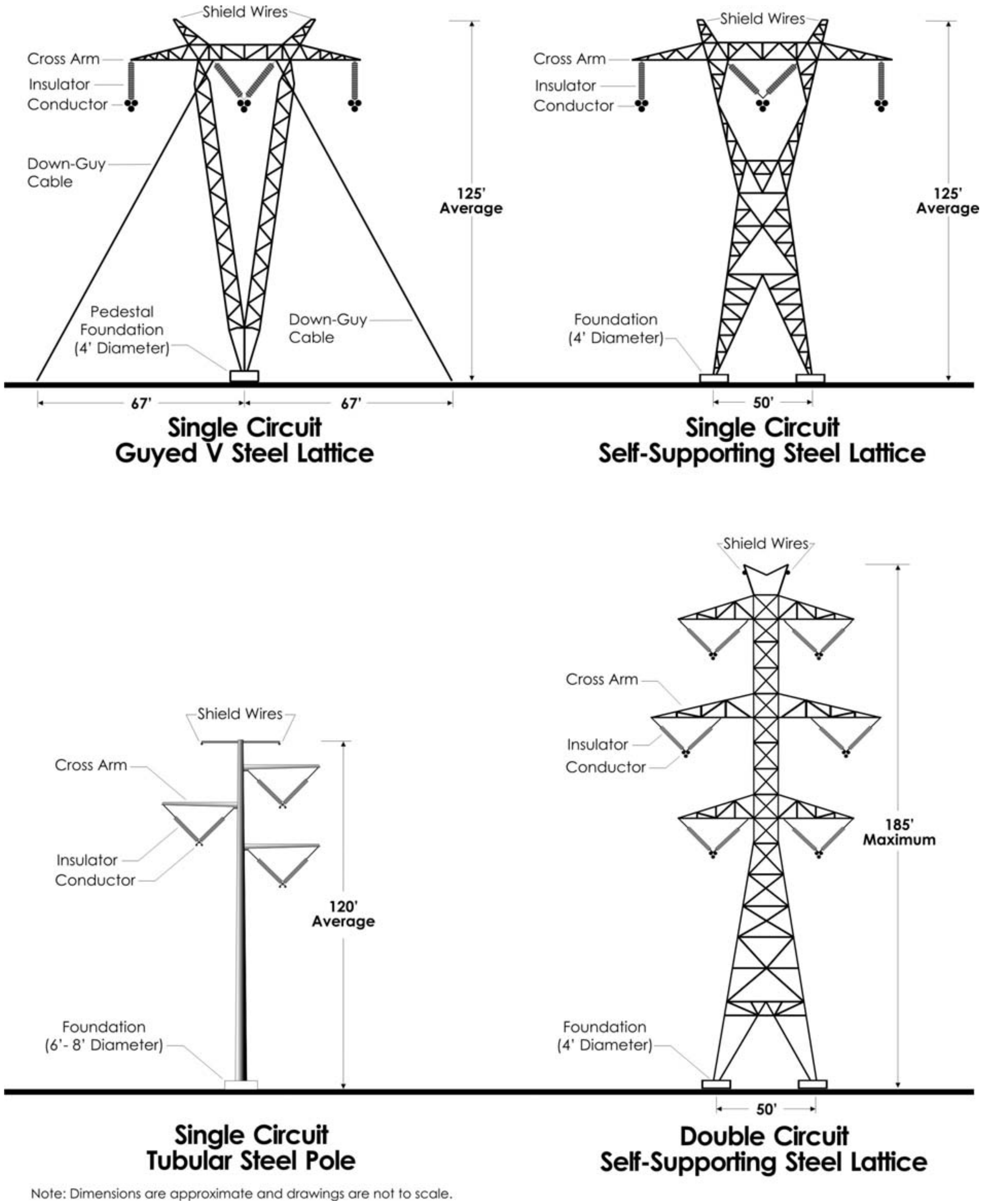

Figure 2-1 Typical 500KV Structure Types

Figure 2-2 Photographs of Typical 500kV Structure Types

Conductors

Selection of the conductor's mechanical strength is primarily dictated by the ice and wind loading that can be expected to occur in the territory where the line is built. The conductor's strength in a steel reinforced (ACSR) stranding is a function of the percentage of steel within the conductor area. The aluminum carries most of the electrical current and the steel provides tensile strength to support the aluminum strands. The extreme icing events in the Montana/Idaho area are not significant compared with the rest of the Midwestern U.S. However, there is some risk of tornado occurrence, for which the conductor percentage of steel recommended for this line should be in the range of 7-9%. This is common for many lines in the Northwest. The percentage of steel for a conductor should be minimized due to its cost and its impact on tower and foundation design and costs, as well as conductor and insulation costs. The conductor that is being considered for the MSTI 500kV Project is a triple bundled ACSR 45/7 1590 kcmil "Lapwing" conductor (1.504 inches in diameter). An important consideration in conductor selection is line losses which typically need to at or below 3%. This is especially important in a transmission line of substantial length such as the MSTI 500kV transmission line. A conductor optimization study is being performed for the project.

The conductor system would consist of three phases, with two, three or four bundle arrangements for each phase. The configuration of the conductor bundle would be determined during the engineering design of the project. Spacing between subconductors in a bundle will be approximately 18 inches.

Minimum conductor height above the ground is approximately 35 feet, based on NESC and NorthWestern's own standards. Greater clearances may be required in areas accessible to vehicles. Minimum conductor clearance would dictate the exact height of each structure based on topography and safety clearance requirements. Minimum conductor clearances in some instances may be greater based on more specific NESC requirements (e.g. minimum clearance above trees in forested areas).

Insulators and Associated Hardware

Insulators are used to suspend the conductors from each structure. Insulators are made of very low conducting materials that inhibit the flow of electrical current from the conductor to the ground or to another conductor. Insulator assemblies in the form of a "V" or an "I" would be used to position and support the conductor bundles while maintaining electrical design clearances between the conductors and the structure (refer to Figures 2-2 and 2-3).

Each "I" or "V" leg string would consist of 26 to 30 insulator disks, and each "I" or "V" leg assembly would be between 14 and 20 feet long. A toughened glass insulator type is proposed for the project. Toughened glass insulators are manufactured disks that are mechanically attached to one another.

Overhead Ground Wires (Shield Wires)

To protect conductors from direct lightning strikes, two overhead ground wires, 3/8 to 7/16 inch in diameter, would be installed on the top of the structures. Electrical current from lightning strikes would be transferred through the groundwires and structures into the ground. The ground wire could contain fiber optic cable to serve, in part, as a communication system for the project in addition to NorthWestern's existing and planned additions to its microwave system. The appearance of the ground wire/fiber optic cable would not be substantially different from a conventional ground wire without fiber optic cable.

Communications (Radio, SCADA, Microwave and Fiber Optic)

The need for a reliable, secure communication system for protective and control relaying for the MSTI 500kV project will require a communications system between the proposed Townsend Substation site in Montana and the existing Midpoint Substation in Idaho. In addition to protective relaying circuits, the communications system would be used for voice communications, telemetering, and supervisory control and data acquisition (SCADA) for the project.

The primary communications system will be single mode fiber optic cabling within the optical power ground wire (OPGW) support strand on the transmission structures, and the secondary communication system will be a point-to-point radio frequency (RF) microwave along a route near enough to the preferred transmission line route as required to support 2-way land/mobile (LMR) communications for use by operations and maintenance staff that will support the transmission line.

The primary communication system will require facilities to provide regeneration and amplification of the fiber optic signals at intervals of approximately 70 to 100 miles. These fiber regeneration sites are located adjacent to the transmission line. Each site would consist of a small building (12 feet x 16 feet) and an emergency generator building placed within the transmission line right-of-way. Fiber is connected from the transmission line to the building allowing for regeneration of the light signal.

The secondary communications system will utilize point-to-point RF microwave systems using 6 gigahertz (GHz) frequencies. Preliminary site identification and RF path profiles have been studied. Initial site studies have indicated that there will be no need for any “green field” sites (i.e. sites that have no existing roads, power and facilities). Some sites will utilize existing buildings and towers. Other sites will require the installation of NorthWestern infrastructure at existing developed communication sites. Sites requiring additional infrastructure are presently planned at locations that have been designated as telecommunications locations by the BLM or USFS or are on private property. All of the presently planned locations are currently being used as telecommunications sites by NorthWestern or other entities.

If additional infrastructure is required, it would involve a small site approximately 100 feet x 100 feet depending on site constraints. An area of about 50 feet x 70 feet would be graded and a gravel surface installed. A 6 foot chain link fence would be erected around this area to provide security and tower access prevention. Maintenance would include sterilization of the gravel area to prevent noxious weed growth and to aid in fire prevention. A typical building would be a precast concrete structure 12 feet x 24 feet x 8 feet with an equipment room and an emergency generator room. A propane fuel tank (normally 1,000 gallons) would be placed near the perimeter fence with access for refueling. The tower height for mounting antennas would depend on the path characteristics to the adjacent system sites. A typical tower would be a triangular steel lattice structure ranging between 40 to 120 feet tall. A typical microwave facility is shown in Figure 2-3.

These facilities are unmanned and operate by automatically responding to incoming signals. Communication signals are relayed using parabolic (bowl shaped) dishes mounted on the tower which capture signals from other microwave sites and relay them to other sites along the system. The signals are short wave length, high frequency radio beams that maintain good reliability under adverse conditions.

Figure 2-3 Typical Microwave Facility

Maintenance of the communication facilities would consist of testing, repair, and replacement of electronic equipment located within the building at the communication site. Inspection and maintenance of the building, communication tower, and other physical equipment would occur periodically.

Preliminary locations for microwave facilities have been identified that provide communications coverage for the preferred route. These preliminary microwave site locations are shown on Figure 2-4. A brief description of each microwave site shown on Figure 2-4 is provided below. The specific location of the final microwave facilities will be determined during detailed design.

Townsend Substation (Montana)

The telecommunications site at the Townsend Substation would be contained within the substation area. A tower would be erected next to the perimeter fence and the equipment would be installed inside the control house. No work would be done outside the substation fence for telecommunications unless connection to a buried cable was required (Qwest), which is unlikely.

Cardwell Hill (Montana)

NorthWestern currently owns property at a site east of Cardwell. The Federal Aviation Agency (FAA) and Alltel have operational sites adjacent to our property. The site would require development (tower construction, building purchase and placement, fence, etc). Access is through private property. The existing road runs through the property.

East Ridge (Montana)

East Ridge is an existing NorthWestern site that has adequate room on the tower and in the building to support the microwave system.

Beef Trail (Montana)

Beef Trail is an existing site owned by NorthWestern. Addition of equipment in the building and antenna to the existing tower is all that is necessary.

Mill Creek (Montana)

Mill Creek is an existing site owned by NorthWestern. Addition of equipment in the building and antenna to the existing tower is all that is necessary

Fleecer (Montana)

Fleecer is an existing site on Forest Service property designated as a telecommunications area. The State of Montana and several other users are current users at this site. The site would require development (Forest Service permit, tower construction, building purchase and placement, fence, etc). There is an existing access road to the site.

Mauer Mountain (Montana)

Mauer Mountain is an established BLM telecommunications site. NorthWestern currently has equipment at this site. Numerous other users exist at this site in multiple buildings. The site would require development (BLM lease, tower construction, building purchase and placement, fence, etc).

Humphrey Ridge (Idaho)

Humphrey Ridge is an existing site on Forest Service property designated as a telecommunications area. Southern Pacific Railroad and several other users are current users at this site. The site would require development (Forest Service permit, tower construction, building purchase and placement, fence, etc). There is an existing access road to the site.

Big Grassy Substation (Idaho)

Big Grassy Substation is an existing Rocky Mountain Power substation. It is adjacent to a county road northeast of Hamer, Idaho. Either a purchase or lease from Rocky Mountain Power or purchase of property adjacent to the sub from a private party are options. The site would require development (Tower construction, building purchase and placement, fence, etc). This location would enable

NorthWestern to make a connection into the substation to retrieve a telemeter signal and interconnect with Rocky Mountain Power's Telecommunications system.

Howe Peak (Idaho)

Howe Peak is a USFS telecommunications site. There are several users presently at the site. The site would require development (Forest Service permit, tower construction, building purchase and placement, fence, etc). There is an existing access road to the site.

American Falls SE (Idaho)

This is an existing telecommunications site. The landownership is private. The site would require development (property purchase, tower construction, building purchase and placement, fence, etc).

Borah Substation (Idaho)

Borah Substation is an Idaho Power Substation.

Dietrich Butte (Idaho)

Dietrich Butte is a designated telecommunications site on BLM lands. There are two cellular users at the site presently. The site would require development (BLM permit, tower construction, building purchase and placement, fence, etc). There is an existing access road to the site.

Midpoint Substation (Idaho)

Midpoint Substation is an Idaho Power Substation.

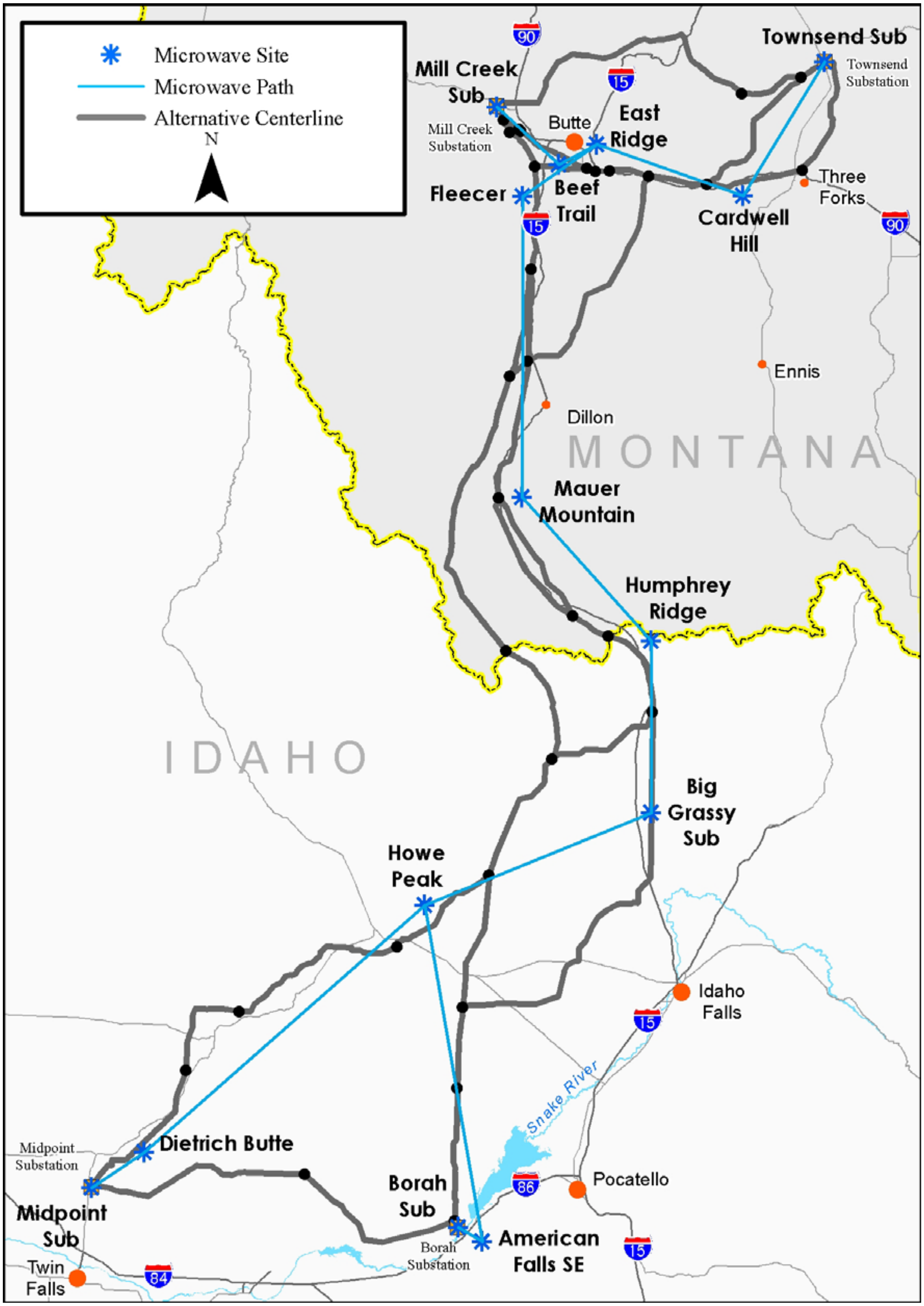

Figure 2-4 Map of Microwave Facility Locations

2.3.2.2 New 500kV Townsend Substation Specifications

Location

The new 500kV Townsend substation would be located in southwestern Montana, five miles south of Townsend, Montana, east of US 287 in Broadwater County. More specifically, the new Townsend Substation would be located approximately 3,000-feet west of Flynn Lane and 1,500 feet north of Dry Creek Road. The current land use of the site is center-pivot irrigation. There are agricultural outbuildings and a residence, located about 1,030-feet south of the substation site. Access to the site would be from Dry Creek Road, and the substation would require additional access road construction. Figure 2-5 is an aerial photograph showing the Townsend Substation site. The total developed substation site would be approximately 52 acres inside the substation perimeter fence line (1,160 feet x 1,950 feet) A visual simulation of the of the 500kV Townsend Substation is presented in Section 4.7 Visual Resources, Figure 4.7-2.

500kV Townsend Substation Specifications

The new Townsend Substation location will be a switching station with five terminals; two terminals to the Broadview Substation, two terminals to the Garrison Substation and one new terminal for the MSTI line. The station will be operated as a breaker-and-a-half with a potential ultimate build out of five bays. The Garrison and Broadview terminals will have series and shunt compensation and the Mill Creek terminal will have shunt compensation with provisions for series compensation. The shunt reactors on the five terminals will be used to control voltage rise conditions during light loading conditions.

The available site will be large enough for the potential future installation of three additional 500kV line terminals with series and shunt compensation.

Modifications to relaying and communications will be required at both the Broadview and Garrison Substations.

The development for the Townsend 500kV Substation will include the following:

- New site, including grading, fencing, ground grid, cable trench and conduit. A site security system will be installed.
- One control shelter to house all the controls, relaying, metering, communications, battery systems and SCADA.
- One maintenance/storage shed for housing spare parts and equipment.
- One microwave tower with control shelter to house all associated equipment.
- Two station service transformers for station power. A backup generator set will be installed for emergency station power.
- New galvanized steel structures for line terminations, switches, instrument transformers, arresters and bus supports.
- Aluminum bussing system comprised of both flexible bundled conductor and rigid tubular bus. All connectors will be extra high voltage (EHV) rated.

- Eight 500kV circuit breakers for the beaker-and-a-half bus. The breakers will be three-pole single phase dead tank, SF6 type.
- Five 500kV circuit breakers for the line shunt reactor banks. The breakers will be three-pole single phase dead tank, SF6 type.
- Thirty-six 500kV disconnect switches for equipment bypass and maintenance. The disconnect switches will be vertical break, single-pole three phase, air break type.
- Five 500kV xxMVA (rating TBD) line shunt reactor banks. Each bank will be comprised of three single phase reactors. The reactors will be oil filled units. One spare single phase reactor will be stored onsite.
- Four series capacitor banks, each bank will be composed of three single phase platforms. Each single phase unit will include an energized platform (steel structure and insulators), capacitors, reactors, varistors, triggered air gap, flexible and rigid bussing, fiber optic communications, instrument transformers, live tank breaker, controls and relaying systems.
- 500kV class instrument transformers and arresters.

A general arrangement plan for the Townsend Substation is shown in Figure 2-6.

Communication (Radio, SCADA, and Microwave)

Presently, communications exist between Broadview Substation and the Garrison Substation for relaying communications. Since the new Townsend Substation will bisect these lines, communications and relaying for the lines will need to be modified such that communications exist between Broadview and Townsend as well as Garrison and Townsend. This will enable relaying schemes to effectively communicate to protect each individual line.

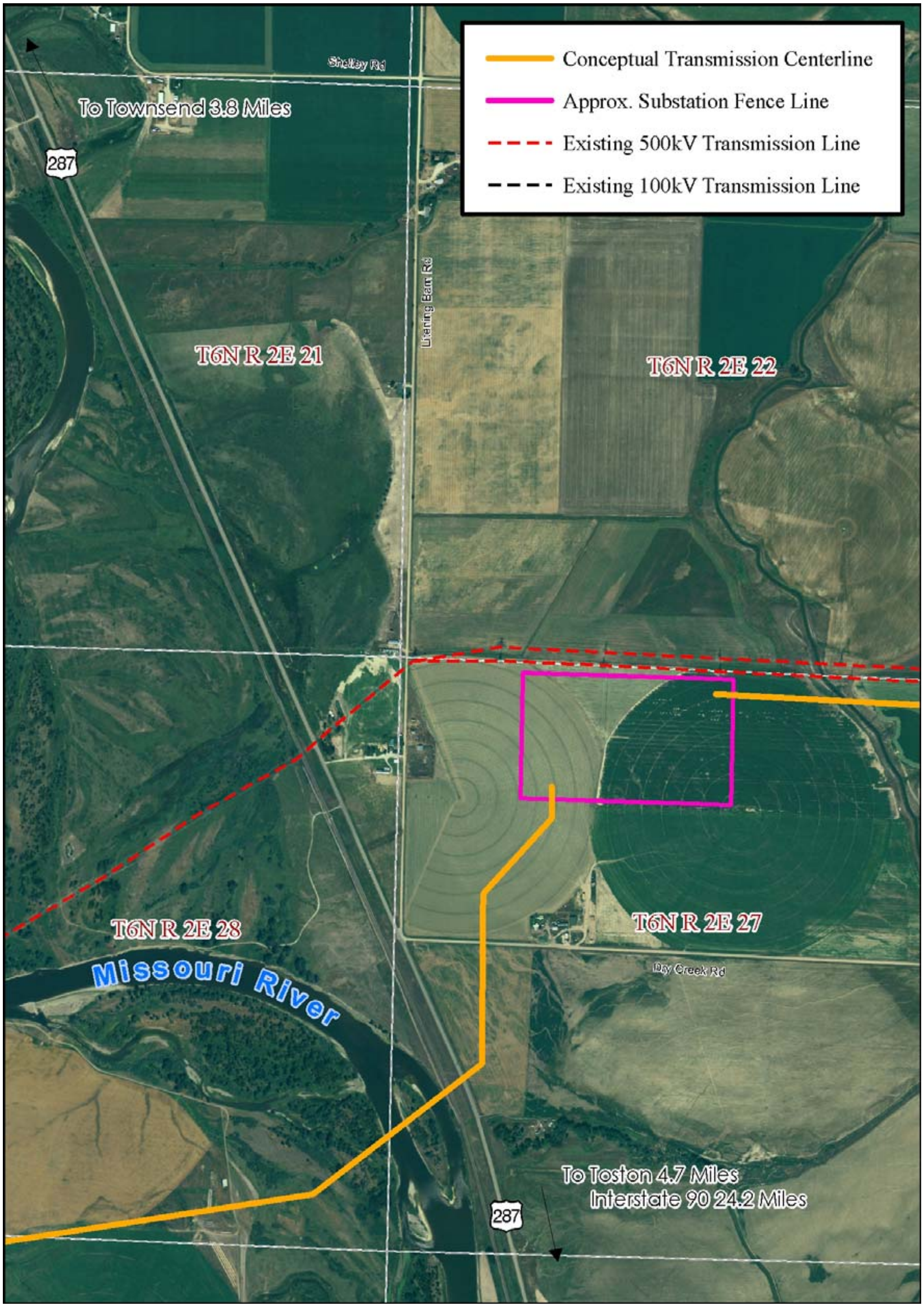

Figure 2-5 Aerial of Townsend Substation Site

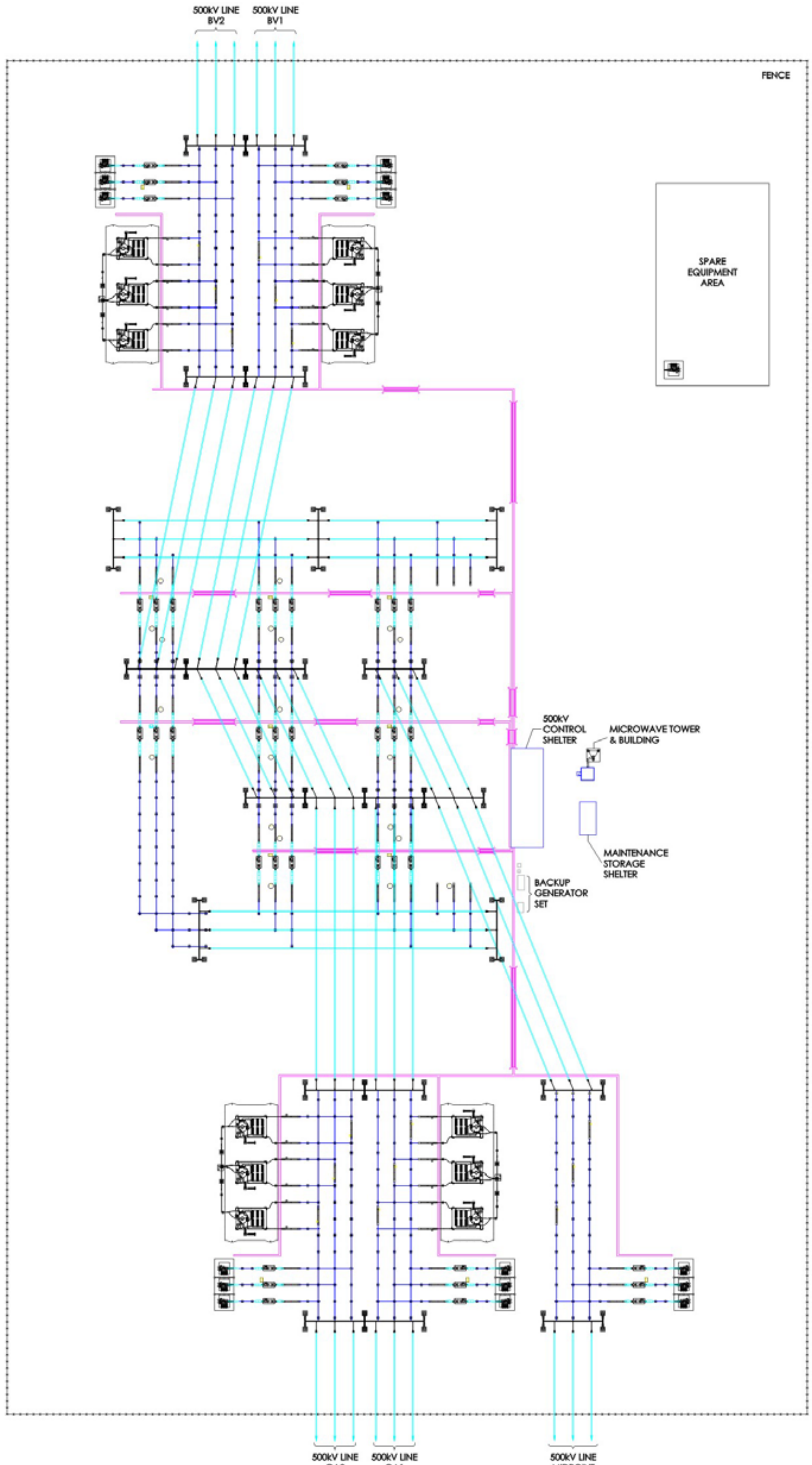

Figure 2-6 Townsend Substation General Arrangement

2.3.2.3 NEW 500KV MILL CREEK SUBSTATION SPECIFICATIONS

LOCATION

A new 500kV Mill Creek Substation would be built adjacent to NorthWestern's existing Mill Creek Substation, located approximately three miles south of Anaconda, Montana.

500KV MILL CREEK SUBSTATION SPECIFICATIONS

Approximately 28 acres inside the perimeter fence line (1,210 feet x 1,030 feet) is required for the substation. The ultimate substation site would require the site to expand to approximately 39 acres inside the substation perimeter fence line (1,210 feet x 1,400 feet).

The proposed new 500kV Mill Creek Substation would be a substation with two terminals; one terminal to the new Townsend Substation and one terminal to the existing Midpoint Substation. The Midpoint line will have series and shunt compensation and the Townsend line will have shunt compensation with provisions for series compensation. The shunt reactors on the two terminals will be used to control voltage rise conditions during light loading conditions. The substation will also have three banks of phase shifting transformers to control electrical flows between the new Townsend Substation and the existing Midpoint Substation. The three banks of phase shifting transformers will be installed so that they can be controlled individually as well as combined. During the initial phase of the project, the substation will be operated as a line-in-line-out with a potential ultimate build out to a five breaker ring bus for future system expansion.

The ultimate build out of the 500kV Mill Creek Substation would include the future installation of one 500kV line terminal, five 500kV breakers completing the five breaker ring bus, and a 230kV yard. The future 230kV yard will be composed of up to two bays of breaker-and-a-half bays with three line terminals.

The new 500kV Mill Creek Substation would not connect directly to or require modification of the existing substation.

The initial installation for the 500kV Mill Creek Substation will include the following:

- New site, including grading, fencing, ground grid, cable trench and conduit. A site security system will be installed.
- One control shelter to house all the controls, relaying, metering, communications, battery systems and SCADA.
- One maintenance/storage shed for housing spare parts and equipment.
- One microwave tower with control shelter to house all associated equipment.
- Two station service transformers for station power. A backup generator set will be installed for emergency station power.
- New galvanized steel structures for line terminations, switches, instrument transformers, arresters and bus supports.

- Aluminum bussing system comprised of both flexible bundled conductor and rigid tubular bus. All connectors will be EHV rated.
- Six 500kV circuit breakers for the phase shifting transformers. The breakers will be three-pole single phase dead tank, SF6 type.
- Two 500kV circuit breakers for the line shunt reactor banks. The breakers will be three-pole single phase dead tank, SF6 type.
- One 500kV circuit breaker for the phase shifting transformers bypass. Breakers will be three-pole single phase dead tank, SF6 type.
- Eighteen 500kV disconnect switches for equipment bypass and maintenance. The disconnect switches will be vertical break, single-pole three phase, air break type.
- Two 500kv xxMVA (rating TBD) line shunt reactor banks. Each bank will be comprised of three single phase reactors. The reactors will be oil filled units. One spare single phase reactor will be stored onsite.
- One series capacitor bank which will be composed of three single phase platforms. Each single phase unit will include an energized platform (steel structure and insulators), capacitors, reactors, varistors, triggered air gap, flexible and rigid bussing, fiber optic communications, instrument transformers, live tank breaker, controls and relaying systems.
- Three xxMVA phase shifting transformer banks, each bank will be composed of three single phase transformers and a tertiary bus. The transformers will be oil filled units. One spare transformer will be stored on site.
- 500kV class instrument transformers and arresters.

A general arrangement plan for the Mill Creek Substation is shown if Figure 2-7.

Communication (Radio, SCADA and Microwave)

Presently, no communications exist between the new Townsend Substation and the existing Midpoint Substation for relaying communications. Relaying and communications will be via microwave and fiber optic. Communications will be installed along the new 500kV MISTI line between the new Townsend Substation and the new Mill Creek Substation and between the new Mill Creek Substation and the existing Midpoint Substation. This will enable relaying schemes to effectively communicate to protect each individual line.

2.3.2.4 Midpoint Substation Modifications Specifications

Location

Idaho Power owns the existing Midpoint Substation that is located on the east side of US 93, approximately 10 miles north of I-84 in Jerome County, Idaho. Access to the substation is from East 750 North Street/Road. No new access road construction to the substation would be required. Parcels to the immediate north and west of the substation are vacant. Parcels to the south, across East 750 North Street/Road have center-pivot irrigation.

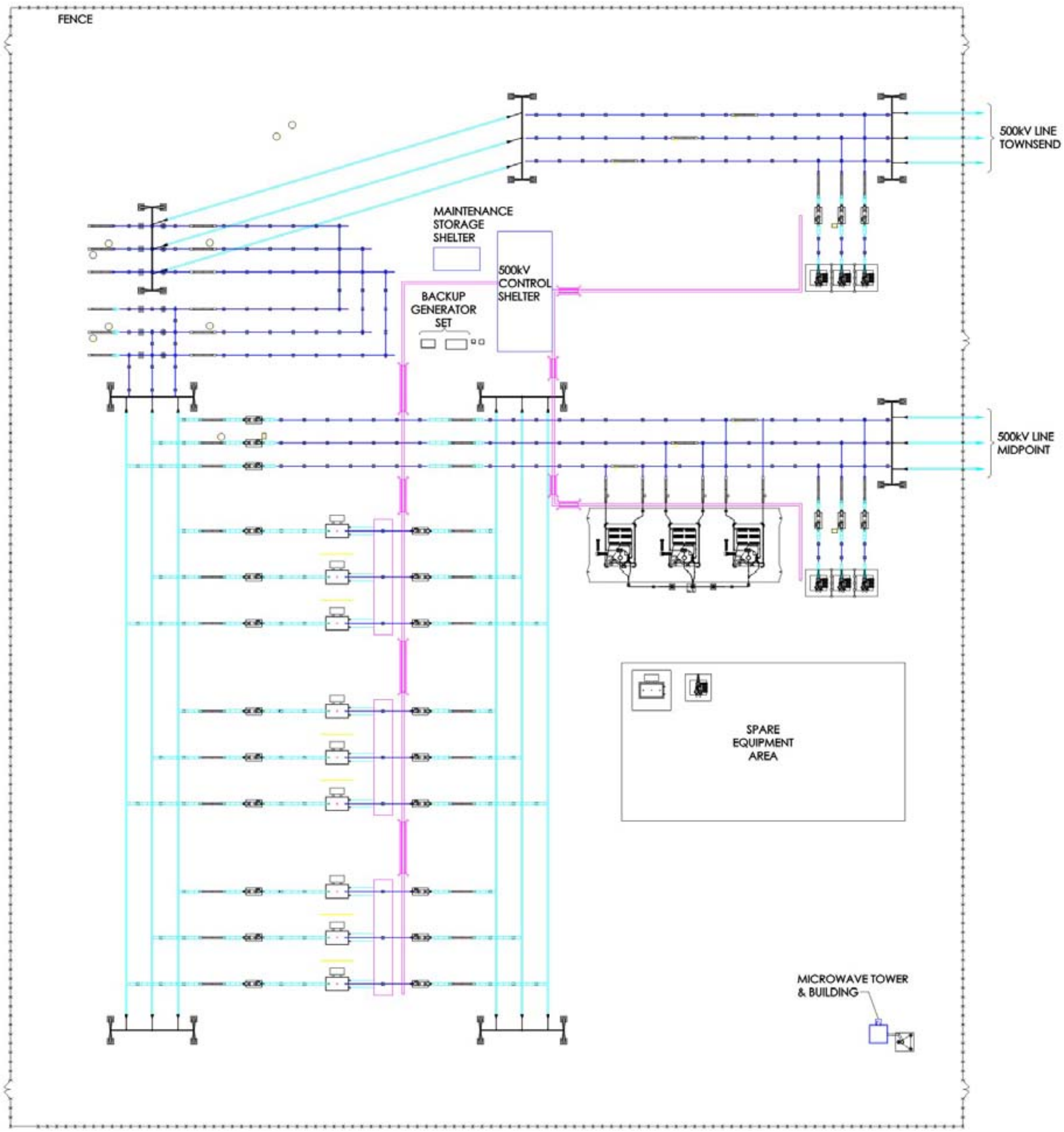

Figure 2-7 Mill Creek Substation General Arrangement

Midpoint Substation Specifications

The existing Midpoint Substation currently has a 500kV section of the station.

The additions to the Midpoint Substation will include one line terminal with; one 500kV breaker, two 500kV disconnect switches, three surge arresters, three instrument transformers, one series capacitor bank and one line shunt reactor bank. It is expected that a line position in an existing 500kV bay is available and the addition of an entire breaker-and-a-half bay will not be required. It is expected that the new relaying and communications can reside in the existing control shelter. The additions to the substation are expected to be completed inside the existing fenced area and no expansion of the substation yard will be required. Idaho Power will ultimately provide the detailed design specifications for the Midpoint Substation modifications.

Communication (Radio, SCADA, and Microwave)

New communications equipment will be required for the new line terminal for relaying communications. Idaho Power will ultimately provide the detailed design specifications for the Midpoint Substation modifications.

2.4 RIGHT-OF-WAY ACQUISITION

New or additional land rights would be needed to accommodate the MSTI project including the transmission line, access roads and substations. The transmission line right-of-way would require a width of 220 feet (Figure 2-8). Where the proposed transmission line would parallel an existing transmission line, the MSTI right-of-way would be adjacent to or overlap the existing right-of-way. The right-of-way width must be sufficient to accommodate guy wires and anchors, and maintenance clearances at the structure sites. Additional right-of-way may be required in areas where the proposed transmission line would turn at a sharp angle and for installation of ground rods.

2.4.1 ACQUISITION OF RIGHT-OF-WAY ACROSS FEDERAL LANDS

NorthWestern would request a Grant of Right-of-Way, from the BLM and a Special Use Permit from the USDA Forest Service (FS) for transmission line facilities located on federal lands. The grant of right-of-way required would be (1) 220 feet wide for a specific number of miles across public lands, (2) for a specific period of time, (3) for the amount of additional right-of-way acreage needed for access roads located outside the 220 foot right-of-way and, (4) for the estimated amount of acreage for an estimated number of additional ancillary facilities that may cross or be constructed on public lands. In addition, temporary use permits would be required for temporary use areas such as material staging areas. Temporary use areas would have to be approved by the land management agency and the temporary use permits issued prior to construction. A typical right-of-way is shown in Figure 2-8.

2.4.2 ACQUISITION OF RIGHT-OF-WAY ACROSS NON-FEDERAL LANDS (STATE AND PRIVATE)

Right-of-way for transmission line facilities on non-federal lands would be obtained in perpetual easements. If necessary, private lands for substations would be purchased in fee simple. Every effort would be made to purchase all the land rights on private lands through reasonable negotiations with the present owners.

All land rights would be acquired in accordance with Federal and State laws and regulations. Once a route for the transmission line has been selected, a list of all landowners with title to property lying within the transmission line right-of-way would be obtained from county records. Permission to enter the property would be requested from the landowners for project personnel to conduct surveys, real property appraisals, environmental studies and geotechnical studies. From survey data of the transmission line and access roads rights-of-way, detailed legal descriptions would be prepared and tract plats of the land rights to be acquired would be drawn.

After title evidence is obtained and land valuation and legal descriptions are completed, realty specialists would present formal offers to acquire the necessary land rights. Land rights would be acquired in the form of an easement contract for transmission line right-of-way and the land for the Townsend Substation would be acquired in fee simple. The realty specialist would explain the project and contract to the landowners. If agreeable to both the landowner and realty specialist, the contract would be signed. The executed contract would be recorded in the official records of the county and the right-of-way would be insured with title insurance. The land owners would be paid the amount of the contract's consideration. Also, all costs incidental to the contract's execution, such as recording fee's, closing costs and title insurance fees would be paid. After completion of construction, realty specialists would work with the landowners to settle any construction damages to the landowners' property.

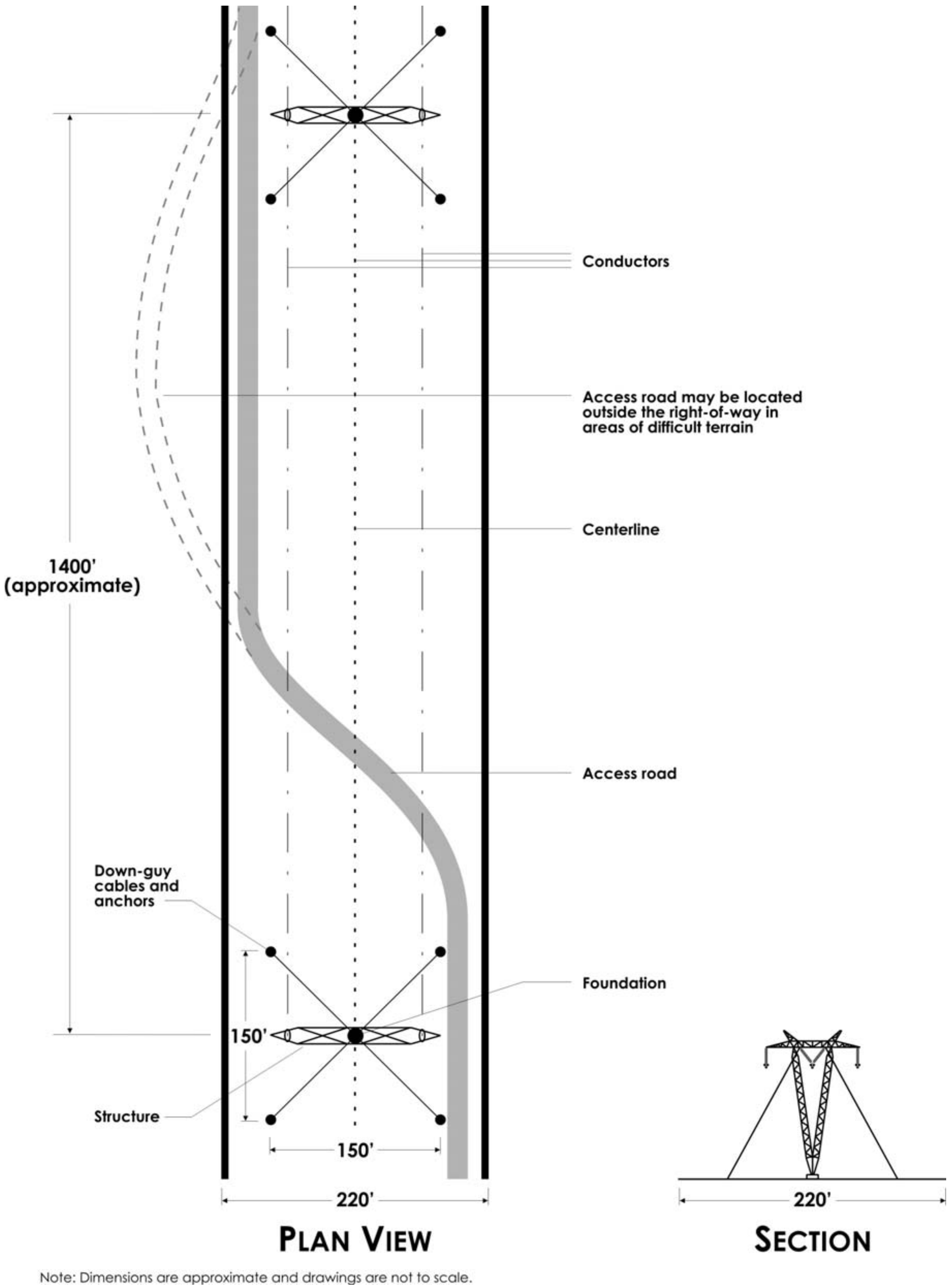

Figure 2-8 Typical Transmission Line Right-of-Way

2.4.3 PLAN OF DEVELOPMENT

Upon selection of a transmission line route, a plan for the development and implementation of the project would be prepared. The BLM refers to the plan as a Plan of Development (POD); the Forest Service refers to the plan as a Construction, Operation and Maintenance Plan (COM Plan). One document, a POD, would be developed for the entire project to satisfy the requirements of the regulatory and land management agencies involved.

A POD is a comprehensive document that completes a right-of-way application. A POD addresses and incorporates requirements, policies and principals of the applicable regulatory and land management agencies, regarding construction, operation, maintenance and abandonment of the transmission line. The document provides detailed descriptions of construction work required, ancillary facility locations, and access road location following selection of the final route and the final design. Agency stipulations and resource protection plans provide detailed guidelines for resource protection and site rehabilitation during and after construction. Also the POD provides information about responsible project and agency authorities and personnel, emergency response plans, health and safety requirements, etc.

2.5 CONSTRUCTION, OPERATION, MAINTENANCE, AND ABANDONMENT

Preconstruction conferences with each affected agency would be conducted to introduce the contractors and their field representatives, discuss mitigation measures and schedules, and introduce each agency's point of contact prior to commencement of construction. As construction proceeds, the construction engineer or inspector would monitor activities and right-of-way authorizations to ensure compliance or to initiate modifications where necessary. In environmentally sensitive areas, an environmental specialist with appropriate qualifications (e.g. biologist, archaeologist) would inspect construction activities to ensure compliance with specific resource mitigation. Following completion of construction, the line would be mapped as as-built and separate packages would be submitted to each of the various agencies to close the right-of-way acquisition process. Post-construction meetings with agencies may be necessary to review the acquisition process and to determine if modifications are needed.

2.5.1 TRANSMISSION LINE

2.5.1.1 Construction

Construction of a transmission line is discussed in the following section according to the sequence of activities listed below (Figure 2-8 and Figure 2-9).

- Surveying the transmission line centerline.
- Access road identification and construction.
- Right-of-way and structure sites clearing (including temporary material staging sites, and batch plants).
- Installing foundations.

- Assembling and erecting the structures.
- Clearing of pulling, tensioning, and splicing sites.
- Installing ground wires and conductors.
- Installing counterpoise/ground rods.
- Cleanup and site reclamation.

Various phases of construction would occur at different locations throughout the construction process. This would require several contractors operating at the same time in different locations.

Surveying Activities

Before construction surveying begins, it would be necessary to obtain either a survey permit on federal and state lands, or rights-of-entry for private lands. Construction survey work would consist of locating the centerline, structure center hubs, right-of-way boundaries; and structure access roads. All of these activities would begin approximately two years prior to the start of construction. Cultural resources and threatened and endangered species intensive surveys can begin once the survey of the centerline and access roads is completed and clearly marked.

Access Road Construction

The construction, operation, and maintenance of the proposed transmission line would require that heavy vehicles access structure sites along the right-of-way. If new access roads are required, they would be constructed to support the weight of these vehicles.

All roads would be upgraded or constructed in accordance with standard construction practices, or according to the land managing agencies' requirements. However, existing paved and unpaved highways and roads would be used, where possible, for the transportation of materials and equipment from storage yards to the areas where they would be needed along the transmission line right-of-way.

Private landowners or land users would be consulted before road construction begins. Road standards and plans for construction, rehabilitation and/or maintenance of roads would be documented in the POD during the engineering design phase of the project. These plans would incorporate the relevant criteria of the affected agencies and landowners or land users.

Where the proposed transmission line would parallel existing transmission lines or other linear utilities, the access roads along the existing utilities would be used wherever possible to minimize the amount of new road construction. However, these roads may require upgrading before they could be used for construction. All roads existing prior to construction of MSTI would be left in a condition equal to or better than the condition prior to construction. Wherever existing roads could be used, only spur roads to structure sites may be needed.

Permanent access roads would be constructed where needed for construction and long-term maintenance. Permanent roads would be graded to a travel service width of 14 feet, including back slopes and side cast material except where turnouts and curves or specifications of the land managing agency require a wider surface width.

Culverts or other drainage structures would be installed as necessary across drainages, but the roads would usually follow the natural grade. Wherever possible, roads would be built at right angles to streams and washes. In addition, road construction would include dust control and erosion control measures in sensitive areas. All existing roads would be left in a condition equal to or better than their condition prior to the construction of the transmission line.

The approximate area of ground disturbance associated with the typical construction activities was estimated for six types or levels of access. The ground disturbance levels are summarized in Table 2-2. These access levels describe the assumptions for the degree of disturbance expected to occur with each access level. Further, the access levels consider areas of as much as five acres per mile that may be temporarily disturbed (e.g., grasses crushed) by structure construction sites, pulling, tensioning, and splicing sites, batch plants, and marshalling yards. This information was combined with slope data to provide an estimate of the potential ground disturbance that could result from upgrading existing roads or constructing new roads. These results were used as part of the impact assessment.

Table 2-2 Access Levels and Ground Disturbance

Level 1	*Existing Improved Roads*	Previously disturbed. Roads generally are in good condition but may require small improvements at stream crossings, steep slope areas, and other locations. New ground disturbance would be minimal. New spur roads would be required to access each structure site; an average of 300 feet of new spur road for each structure. Spur roads would disturb approximately 0.4 acres per mile of transmission line.
Level 2	*Roads that Require Improvement*	Previously disturbed. Existing two-track or narrow unimproved roads would require improvement to make roads serviceable (e.g., mowing, grading) for construction. Low ground disturbance; assume approximately 0.5 to 1.0 miles of road improvements for each mile of transmission line. Road improvements would disturb approximately 0.75 to 1.0 acres per mile of transmission line. An average of 300 feet of spur roads would be required to access each structure site. Spur roads would disturb about 0.4 acres per mile of transmission line.
Level 3	*Construct Road in Flat Terrain (0 to 8 percent)*	Low to Moderate ground disturbance for new access road construction; assume approximately 1.0 to 1.2 miles of new roads would be required for each mile of transmission line. Road construction would disturb approximately 1.7 to 2.0 acres per mile of transmission line.

Table 2-2 Access Levels and Ground Disturbance (*cont.*)

Level 4	*Construct Road in Sloping Terrain (8 to 15 percent)*	Moderate ground disturbance for new access road construction; assume 1.2 to 1.5 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 2.0 to 2.5 acres per mile of transmission line.
Level 5	*Construct Road in Steep Terrain (15 to 30 percent)*	Moderate to high ground disturbance for new access road construction; assume approximately 1.5 to 2.0 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 2.5 to 3.4 acres per mile of transmission line.
Level 6	*Construct Road in Very Steep Terrain (over 30 percent)*	High to very high ground disturbance for new access road construction; assume approximately 2.0 to 3.0 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 3.4 to 5.0 acres per mile of transmission line.

All roads would be constructed in accordance with NorthWestern requirements for transmission line access roads (also refer to description above). In the event of a conflict between NorthWestern requirements and the requirements of the BLM and FS, the states of Montana, Idaho, or other agencies, the governing agency requirements would take precedence. Private landowners along the proposed roads would be consulted before construction begins.

Structure Site Clearing

At each structure site, leveled areas (pads) would be needed to facilitate the safe operation of equipment, such as construction cranes. The leveled area required for the location and safe operation of large cranes would be approximately 30 by 40 feet. At each structure site, a work area of approximately 200 by 200 feet would be required for the location of structure footings, assembly of the structure, and the necessary crane maneuvers. The work area would be cleared of vegetation only to the extent necessary. After line construction, all pads not needed for normal transmission line maintenance would be graded to blend as near as possible with the natural contours, and renegotiated with indigenous plant species where required. Areas would be reseeded prior to the season(s) when precipitation is normally received.

Clearing of Right-of-Way

The clearing of some natural vegetation may be required. However, selective clearing would be performed only when necessary to provide for land surveying activities, electrical safety clearances, long-term maintenance and reliability of the transmission line. Within or adjacent to the right-of-way topping or removal of mature vegetation, under or near the conductors, would be performed to provide adequate electrical clearance as required by NESC standards.

Trees that could fall onto the transmission line, affect the transmission line during wind-induced line swing, or otherwise present an immediate hazard to the transmission line or have the potential to encroach within a safe distance to the conductor as a result of bending, growing, swinging or falling toward the conductor would be removed. Normal clearing procedures are to top or remove large trees and not disturb smaller trees. If a conflict were to arise regarding clearance procedures, the conflict would be jointly reviewed and agreed upon between NorthWestern and the owners or managers of the property.

Construction Yards/Material Staging Sites

Temporary material staging sites would be located near each end of the transmission line and approximately every 40 miles along the route. These would be located in previously disturbed areas or in areas of minimal vegetative cover where possible and would require five acres of land. The location of all sites would be determined through discussions with landowners or the land-managing agency.

Concrete used to construct foundations would be dispensed by a variety of methods as described below under Concrete Sources and Delivery. One method is to use a portable concrete batch plant. Approximately one acre of land is required for each site. A rubber-tired flatbed truck and tractor would be used to relocate each plant along the right-of-way.

The construction yards/temporary material staging areas would serve as field offices, reporting locations for workers, parking spaces for vehicles and equipment, sites for material storage, and stations for equipment maintenance. Facilities may be fenced and their gates locked. Security guards would be assigned where needed.

Diesel fuel, gasoline, oil and other lubricants as well as adhesives and sealants would be utilized during construction of the transmission line and the substations. Bulk quantities would be stored in designated construction yards/materials staging sites. Vehicle fueling and maintenance activities would be restricted to staging areas or approved areas away from drainage channels or sensitive habitats. All construction vehicles would be monitored for leaks and receive regular off-site preventative maintenance to reduce the chance of leakage. A spill plan would be prepared and implemented to minimize potential adverse effects associated with leaks and/or spills during fueling.

Concrete Sources and Delivery

Ready mixed concrete from retail establishments would be used for concrete requirements within a 35 mile haul distance from the existing ready mix batch plant. These existing batch plants are normally located in or near cities and major towns. Ready mix trucks would use access roads established for other construction equipment.

For occasions where a minimal amount of concrete is required in a remote location, concrete would be mixed with volumetric concrete trucks. The volumetric mixer truck with compartments for sand, aggregate, cement and water drives to a foundation site and proportionately combines the ingredients to make concrete.

For sections of tubular pole construction in remote areas, a field concrete batch plant would be established. The foundations for tubular poles require significant amounts of concrete and more automated batching is needed. The concrete would be delivered by ready-mix concrete trucks which would use access roads established for other construction equipment.

Foundation Installation

Excavations for foundations would be made with power drilling equipment. Where the soil permits, a vehicle-mounted power auger or backhoe would be used. In rocky areas, the foundation holes may be excavated by drilling and blasting, or installing special rock anchors. All safeguards associated with using explosives (e.g., blasting mats) would be employed when adjacent areas need to be protected. Blasting activities would be coordinated with the appropriate land-managing agency, particularly for purposes of safety and protection of sensitive areas.

In extremely sandy areas, soil stabilization by water or a gelling agent may be used to stabilize the soil before excavation. After excavations are completed, pre-cast or cast-in-place foundations would be installed. Steel grillage foundations may be specified in mountainous areas.

Pre-cast Footings for Guyed Structures

The pre-cast footing would be lowered into an excavated foundation hole, positioned, backfilled and cast in place. The cast-in-place footing would be installed by placing reinforcing steel and a structure stub into the foundation hole, positioning the stub, and encasing it in concrete. Spoil material would be used for fill where suitable or spread at the construction site. The foundation excavation and installation would require access to the site by a power auger or drill, a crane, material trucks, and ready-mix trucks.

Structure Assembly and Erection

Bundles of steel members and associated hardware would be shipped to each structure site by truck. Steel members would be assembled into subsections of convenient size and weight. The assembled subsections would be hoisted into place by a large crane and then fastened together to form a complete structure. Figures 2-9 and 2-10 illustrate typical construction activities.

Conductor Installation

After the structures are erected, insulators, hardware, and stringing sheaves would be delivered to each structure site. The structures would be rigged with insulator strings and stringing sheaves at each ground wire and conductor position.

For public protection during wire installation, guard structures would be erected over highways, railroads, power-lines, structures, and other obstacles. Guard structures would consist of H-frame poles placed on either side of an obstacle. These structures would prevent ground wire, conductor, or equipment from falling on an obstacle. Equipment for erecting guard structures would include augers, line trucks, pole trailers, and cranes. Guard structures may not be required for small roads. In such cases other safety measures such as barriers, flagmen, or other traffic control would be used.

Following stringing and tensioning of all conductors, the guard structures would be removed.

Pilot lines, would be pulled (strung) from structure to structure by a helicopter and threaded through the stringing sheaves at each structure. Following pilot lines, a larger diameter, stronger line would be attached to conductors to pull them onto structures. This is called the pulling line. This process would be repeated until the ground wire or conductor is pulled through all sheaves.

Ground wire and conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment as shown on Figure 2-9. Sites for tensioning equipment and pulling equipment would be approximately three miles apart. If a fiber optic ground wire is installed rather than conventional ground wire, the construction methods would be the same. The appearance of a fiber optic ground wire is the same as conventional ground wire.

The tensioning site would be an area approximately 200 feet wide by 600 feet long. Tensioners, line trucks, wire trailers, and tractors needed for stringing and anchoring the ground wire or conductor would be located at this site. The tensioner, in concert with the puller, would maintain tension on the ground wire or conductor while they are fastened to the structures.

The pulling site would require approximately half the area of the tension site. A puller, line trucks, and tractors needed for pulling and temporarily anchoring the counterpoise/ground wire and conductors would be located at this site.

Ground Rod Installation

Part of standard construction practices prior to conductor installation would involve measuring the resistance (known as “ohm”) of the ground to electrical current near the structure footings. If the resistance to remote earth for each transmission structure is greater than 25 ohms, ground rods 8 to 16 feet in length would be installed in the ground. If ground rods do not provide sufficient grounding, counterpoise (grounds) would be installed to lower the resistance to 10 ohms or less. Counterpoise would consist of a bare copper clad or galvanized steel cable buried a *minimum* of 12 inches deep, extending from one or more structure legs for approximately 200 feet.

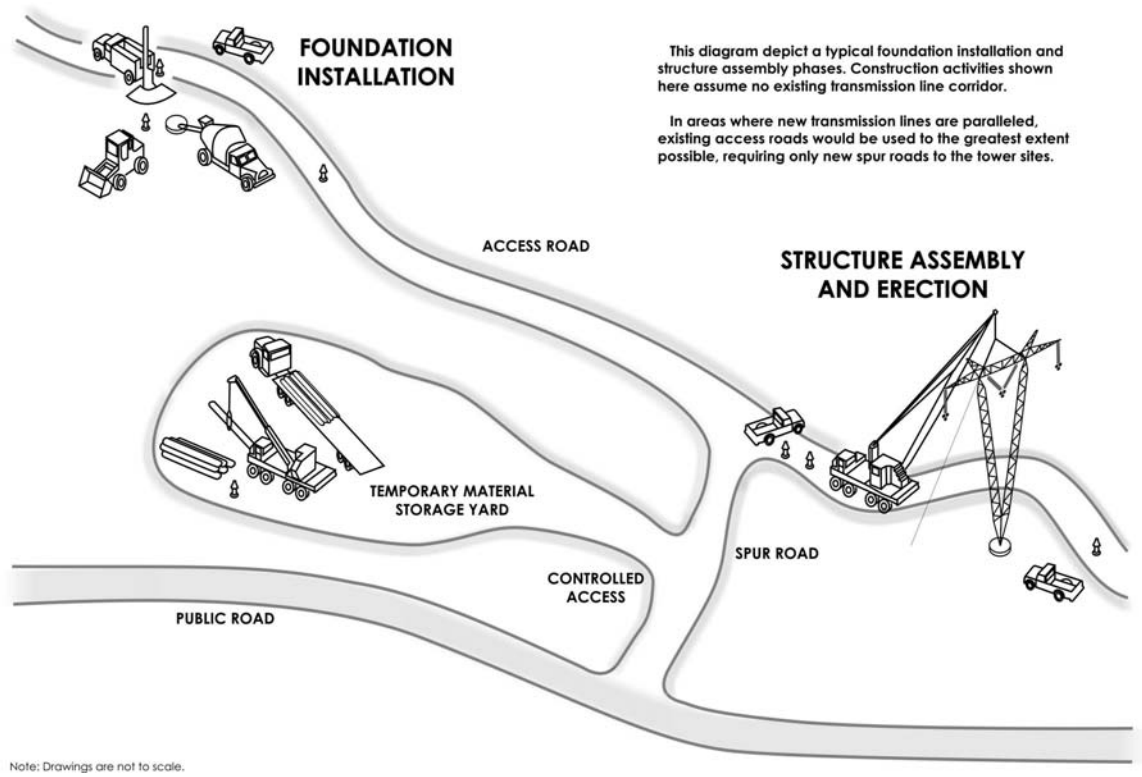

Figure 2-9 Foundation and Structure Construction Activities

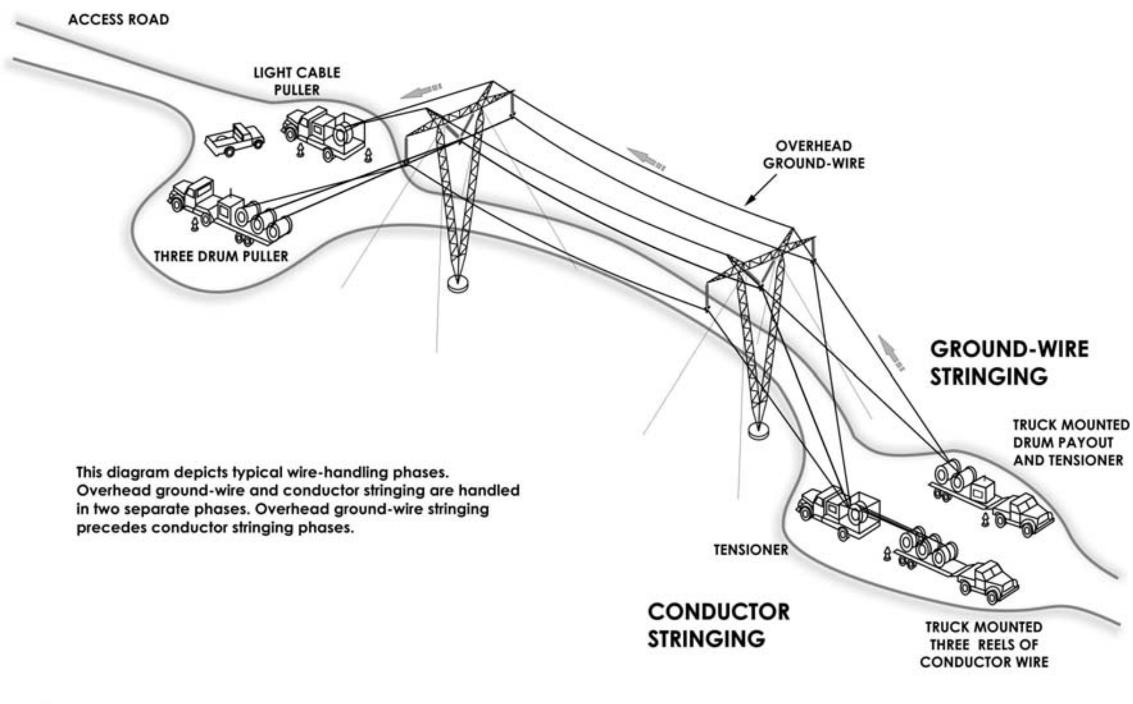

Figure 2-10 Conductor and Ground-Wire Stringing Activities

Erosion and Sediment Control/Pollution Control During Construction

A construction Storm Water Pollution Prevention Plan (SWPPP) would be developed for the project for erosion, sediment and pollution control during construction. The SWPPP would be prepared to meet the requirements of the Montana Department of Environmental Quality's (MDEQ) General Permit to Discharge Storm Water through its storm water pollution control program (Montana Water Quality Act 75-5-401 et seq., MCA) associated with construction activities. The SWPPP would include both structural and non-structural best management practices (BMPs). Examples of structural BMPs could include installing silt curtains or other physical controls to divert flows from exposed soils, or otherwise limit runoff and pollutants from exposed areas. Examples of non-structural BMPs include management practices such as materials handling and waste disposal requirements and spill prevention methods. NorthWestern would prepare and submit a SWPPP meeting the conditions of the General Permit to Discharge Storm Water to the MDEQ along with a Notice of Intent (NOI) for construction activities prior to the start of projection construction.

Control of Noxious Weeds and Invasive Plants

NorthWestern will develop a Noxious Weed and Invasive Plant Control Plan to minimize the potential for the spread of weeds and invasive plants, and to minimize their spread within the project area. The plan will prescribe measures to prevent and control the spread of noxious weeds and invasive plants during and following construction of the project. The primary objectives of noxious weed and invasive plant control will be:

- To acquire information on the occurrence, distribution and abundance of noxious weeds and invasive plants in the project area prior to construction.
- To reduce/eliminate existing infestation and prevent the spread of new and existing populations of noxious weeds and invasive plants within the project area.
- To ensure any populations of rare plants within the project area are not negatively affected by control activities.
- To coordinate and consult with federal land management agencies (BLM and USFS), MDEQ and Montana county weed control districts regarding noxious weed control activities to be conducted by NorthWestern within the project area to ensure compatibility with existing weed control protocols and requirements.

Cleanup and Construction Waste Disposal

Construction sites, material storage yards, and access roads would be kept in an orderly condition throughout the construction period. Refuse and trash would be removed from the sites and disposed of in an approved manner. Oils and fuels would not be dumped along the line. Oils or chemicals would be hauled to a disposal facility authorized to accept such materials. No open burning of construction trash would occur without agency approval.

Petroleum products such as gasoline, diesel fuel, helicopter fuel, crankcase oil, lubricants, and cleaning solvents would be present within the transmission line corridor during construction. These products would be used to fuel, lubricate, and clean vehicles and equipment. These products would be containerized by fuel trucks or by approved containers. When not in use, hazardous materials would be properly stored to prevent drainage or accidents.

Hazardous materials would not be drained onto the ground or into streams or drainage areas. Totally enclosed containment shall be provided for all trash. All construction waste including trash, litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials.

All construction, operation, and maintenance activities would comply with all applicable federal, state, and local laws and regulations regarding the use of hazardous substances. The construction or maintenance crew foreman would insure that all applicable laws are obeyed. In addition, an on-site inspector would be present during construction to make sure that all hazardous materials are used and stored properly. A health and safety plan would be developed as part of the POD preparation during the engineering and preconstruction phase of the project.

Site Reclamation

After construction is completed, the right-of-way would be restored as required by the property owner or land management agency. All practical means would be made to restore the land to its original contour and to restore natural drainage patterns along the right-of-way. Because revegetation would be difficult in many areas of the project where precipitation is minimal, it would be important to minimize disturbance during the construction. All practical means would be made to increase the chances of vegetation reestablishment in disturbed areas.

Restoration activities would consist of restoring temporarily disturbed areas as close as possible to their original condition. This excludes the access roads, which would remain in place for the life of the project. The areas affected by construction would be seeded with an appropriate seed mix where there is adequate soil moisture, as appropriate to the location. Similar restoration activities would be followed at areas temporarily disturbed for construction staging, equipment laydown and temporary construction access. On site construction management would monitor for erosion and implement additional control measures if necessary.

Construction cleanup and permanent erosion-control measures would be carried out in accordance with the project SWPPP.

The total construction period would be approximately three years. The POD that would be prepared during the engineering and preconstruction phase of the project would address site reclamation of disturbed areas.

Fire Protection

All applicable fire laws and regulations would be observed during the construction period. All construction personnel would be advised of their responsibilities under the applicable fire laws and regulations, including taking practical measures to report and suppress fires. A fire protection and suppression plan will be developed as part of the POD preparation during the engineering and preconstruction phase of the project.

Transmission Line Construction Schedule and Work Force

It is estimated that the total construction time for the transmission line would be 32 months. Construction is anticipated to begin in July 2010 and last for 136 weeks and be completed by January

2013. The target date for commercial operation is mid 2013. Construction of the Townsend Substation, and substation additions at Mill Creek and Midpoint would occur during the same time frame as transmission line construction.

Construction services will be divided into a number of contractor awards. It is anticipated that two contracts for transmission line construction would be awarded; one each for the Montana and Idaho portions of the line. Likewise, it is anticipated that substation construction and additions would be preformed with two contractors, one for each state. It is anticipated that one or two small specialty subcontractors would be used for the communications facilities for the entire project. Some of the communications work may also be performed by NorthWestern's workforce.

The mountainous area at the Montana-Idaho state line will necessitate beginning construction in early spring 2010 and having each contractor work north and south of the state line respectively until the line terminates at the Townsend Substation in Montana, and the Midpoint Substation in Idaho. The actual starting point is generally decided prior to taking construction bids and depends on the status of right-of-way acquisition, weather, availability of materials, etc. Construction work would be performed with conventional construction techniques in accordance with NESC codes, OSHA, Institute of Electrical and Electronic Engineers, American Concrete Institute, and other industry-specific standards.

The total workforce that would be required to complete construction would be just over 200 workers. It is assumed that construction would occur during a six day work week.

Table 2-3 lists the major construction activities and the number of workers per crew for the transmission line. Equipment size would range from light to heavy duty. Table 2-4 lists the equipment needed for construction of the transmission line, substation and communications facilities. Figure 2-11 illustrates the workforce requirements and duration during construction.

Schedules and anticipated construction workforce requirements for the Townsend and Mill Creek substations and the Midpoint Substation additions are presented in sections 2.5.2 .1.

Table 2-3 Major Construction Activities and Number of Workers Per Crew

Work Item	Estimated Duration (Weeks)	Crews	Workers Per Crew	Total Workers
Construction Management	156	1	2	2
Inspection	156	1	6	6
Contractor Mobilization	6	0	0	0
Receive and Handle Materials	156	1	6	6
Survey/Stake Access Roads and Structure Pads	61	1	2	2

Table 2-3 Major Construction Activities and Number of Workers Per Crew (*cont.*)

Work Item	Estimated Duration (Weeks)	Crews	Workers Per Crew	Total Workers
Construct Access Roads and Structure Pads	61	1	4	4
Survey/Stake New Structure Locations	61	1	2	2
Excavate Structure Holes	65	2	2-3	5
Blast Structure Holes	50	2	3	6
Tie and Haul Rebar	82	1	6	6
Set Forms and Pour Concrete	82	2	5	10
Portable Batch Plant(s) and Concrete Trucks	0	1	8	8
Load Steel and Materials for Field	82	1	3	3
Haul Steel and Materials	82	1	3	3
Haul Blocking and Shake Out Steel	82	2	5	10
Assemble Towers	82	7	8	56
Bottom Setting Crew (Legs and Small Body Ext)	82	1	7	7
Tower Torquing Crew	82	1	4	4
Erect Towers	82	1	10	10
Backbolt and Torque After Erection	82	1	6	6
Load, Haul, and Spot OHGW, OPGW, and Conductors	65	1	4	4
Install and Remove Guard Pole Structures	42	1	3	3
Install Shield, OPGW, and Conductors	65	1	20	20
Sag, Clip Dead End Spacers, Dampers	65	1	12	12
Final Clean Up/Gig Sheet	61	1	3	3
Reclamation/Restoration	65	1	5	5
TOTAL				**203**

OHGW = overhead ground wire; OPGW = optical power ground wire

Table 2-4 Construction Equipment

Work Item	Construction Equipment
Construction Management	2 4x4 pickups
Inspection	5 4x4 pickups
Receive and Handle Materials	1 pickup
	2 crew trucks
	1 crane
	1 forklift
Survey/Stake Access Roads and Structure Pads	1 helicopter
	2 pickup trucks
Construct Access Roads and Structure Pads	2 bulldozers (D-6 or D-8)
	2 motor graders
	2 pickup trucks
	water trucks (construction and maintenance)
Survey/Stake New Structure Locations	1 helicopter
	2 pickup trucks
Excavate Structure Holes	1 mechanic truck
	2 diggers
	2 crew trucks
	1 backhoe/front end loader
Tie and Haul Rebar	2 flatbed trucks w/boom
	2 crew trucks
Set Forms and Pour Concrete	2 crew trucks
	4 concrete trucks
Load Steel and Materials for Field	1 crane and/or forklift
	1 flatbed truck w/boom
Haul Steel and Materials	6 steel haul trucks
	1 yard crane (heavy duty)
	2 pickup trucks
Haul Blocking and Shake Out Steel	4 flatbed trucks w/boom
	4 cranes and/or forklift
	2 crew trucks
Assemble Towers	4 cranes (rubber tired)
	4 trucks (2 ton)
	4 carry alls
	4 pickup trucks

Table 2-4 Construction Equipment (*cont.*)

Work Item	Construction Equipment
Bottom Setting Crew (Legs and Small Body Ext.)	2 cranes 4 crew trucks
Tower Torquing Crew	4 air compressors 2 crew trucks
Erect Towers	2 cranes (60 ton) 2 trucks (2 ton) 3 crew trucks
Backbolt and Torque After Erection	4 air compressors 2 crew trucks
Load, Haul, and Spot OHGW, OPGW, and Conductors	2 flatbed trucks w/boom 2 crew trucks
Install and Remove Guard Pole Structures	1 truck w/boom and trailer 1 digger 1 crew truck
Install Shield, OPGW, and Conductors	1 helicopter and fly ropes 3 drum pullers (1 light, 1 medium, 1 heavy) 2 splicing trucks double-wheeled tensioners (1 light, 1 heavy) 6 wire reel trailers 2 diesel tractors 1 crane (2 to 4 ton) 4 trucks (5 ton) 6 pickup trucks
Sag, Clip Dead End Spacers, Dampers	1 conductor puller 1 shield/fiber puller 2 cranes 2 sock line trailers 2 flatbed trucks w/boom 2 high reach boom trucks
Final Clean Up/Gig Sheet	2 trucks (2 ton) 2 pickup trucks
Reclamation/Restoration	1 bulldozer (D-8) 2 motor graders 2 crew trucks

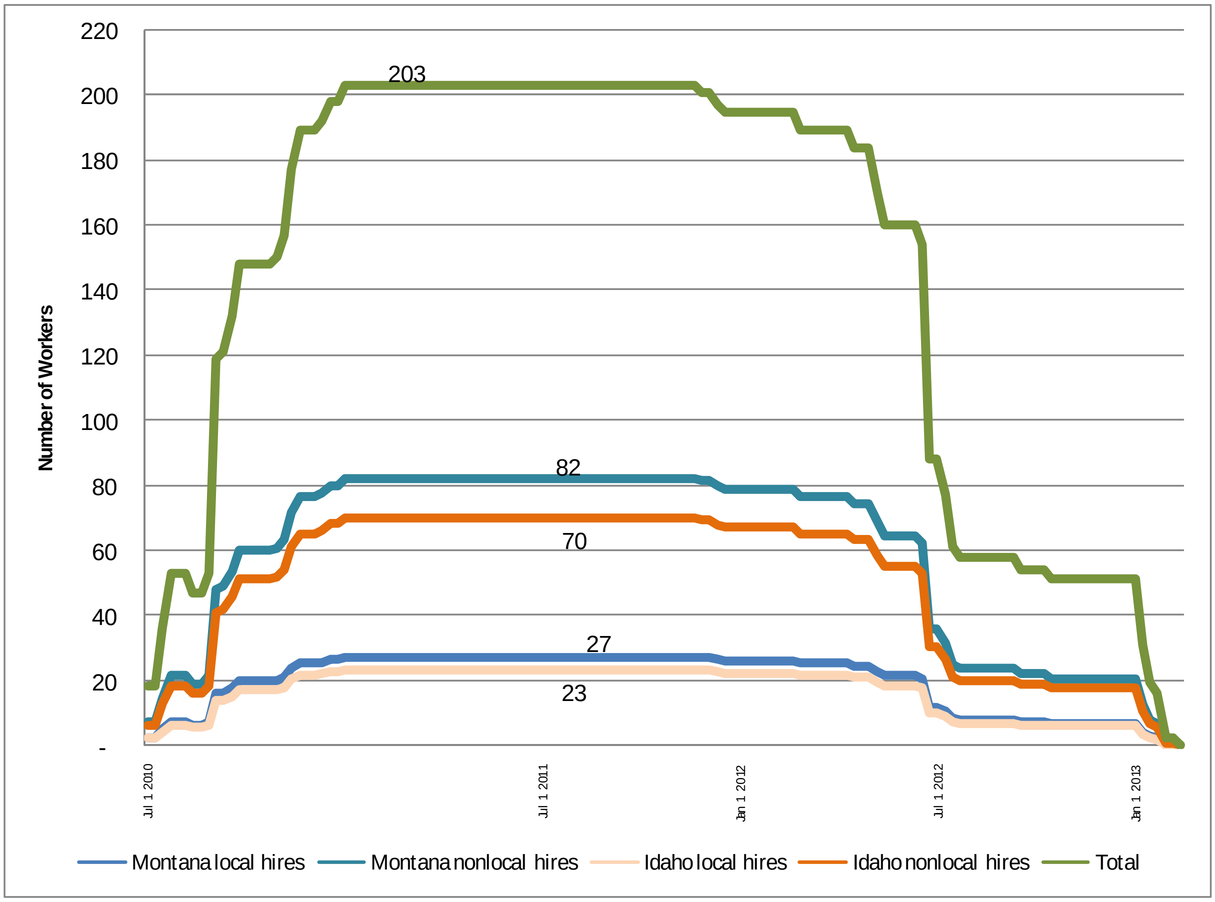

Figure 2-11 Estimated Workforce and Duration for Transmission Line Construction

Estimated Cost

The estimated cost for transmission line construction (with escalation) is $573 million. This includes material and labor costs as well as engineering, field office, procurement, project management and construction management, aerial photogrammetry and survey and a 20 percent contingency. The cost per mile (based on a transmission line of approximately 430 miles in length) is $1.34 million per mile. Right-of-way acquisition costs are estimated at $36 million. The cost estimate was prepared using unit costs, and recent knowledge and experience with vendors and contractors.

2.5.1.2 Operation, Maintenance and Abandonment

OPERATIONAL CHARACTERISTICS

The nominal voltage for the MSTI transmission line would be 525kV AC. There may be minor variations of up to five percent above the nominal level depending upon load flow.

PERMITTED USES

After the transmission line has been energized, land uses that are compatible with safety regulations would be permitted in, and adjacent to, the right-of-way. Existing land uses such as agriculture and grazing are generally permitted within the right-of-way. Incompatible land uses within the right-of-way include construction and maintenance of inhabited dwellings, and any use requiring changes in surface elevation that would affect electrical clearances of existing or planned facilities.

Land uses that comply with local regulations would be permitted adjacent to the right-of-way. Compatible uses of the right-of-way on public lands would have to be approved by the appropriate agency. Permission to use the right-of-way on private lands would have to be obtained from the owner of the transmission line (i.e. NorthWestern).

SAFETY AND GROUNDING

Safety is a primary concern in the design of this 500kV transmission line. An AC transmission line would be protected with power circuit breakers and related line relay protection equipment. If conductor failure occurs, power would be automatically removed from the line. Lightning protection would be provided by overhead ground wires along the line.

All buildings, fences and other structures with metal surfaces located within 200 feet of the centerline of the right-of-way would be grounded. Typically, residential buildings located 200 feet from the centerline would not require grounding. Other buildings or structures beyond 200 feet would be reviewed in accordance with NESC standards to determine grounding requirements. Also, all metal irrigation systems that parallel the transmission line for distances of 1,000 feet or more within 100 feet of the centerline would be grounded. If grounding is required outside of the right-of-way, land management agency or land owner consent would be obtained as necessary.

MAINTENANCE

The 500kV transmission line would be inspected annually or as required by both ground and air patrols. Maintenance would be performed as needed. When access is required for non-emergency maintenance and repairs, NorthWestern would adhere to the same precautions that were taken during the original construction. Also, NorthWestern would comply with requirements of the land management agencies regarding the management of noxious weeds within the right-of-way and transmission line access roads.

Emergency maintenance would involve prompt movement of repair crews to repair or replace any damaged equipment. Crews would be instructed to protect crops, plants, wildlife, and other resources of significance. Restoration and reclamation procedures following completion of repair work would be similar to those prescribed for normal construction. The comfort and safety of local residents would be provided for by limiting noise, dust, and the danger caused by maintenance vehicle traffic. Details would be provided in the POD prior to line construction.

ABANDONMENT

At the end of the useful life of the proposed project, if the facility were no longer required, the transmission line would be abandoned. NorthWestern would coordinate with the appropriate land management agencies to develop a plan for abandonment. For example, conductors, insulators and hardware would be dismantled and removed from the right-of-way. Structures would be removed and foundations broken off below ground surface.

If the line and associated right-of-way are abandoned or no longer needed at some future date, the right-of-way would be available for the same uses that existed prior to construction of the project.

Following abandonment and removal of the transmission line from the right-of-way, any areas disturbed to dismantle the line would be restored and rehabilitated as near as possible to their original condition.

2.5.2 SUBSTATIONS

2.5.2.1 Construction

Two new substations would be constructed in Montana; the 52 acre Townsend Substation located five miles south of Townsend, Montana, east of US 287 in Broadwater County and the 28 acre Mill Creek Substation located three miles south of Anaconda, Montana. Modifications to the existing Midpoint Substation in Idaho would be required to accommodate the new MSTI 500kV transmission line.

The construction of a substation typically consists of, but is not limited to the following sequence of activities:

- Cut and fill grading
- Placement and compaction of structure fill to serve as a foundation for equipment
- Grading to maintain drainage patterns
- Oil spill containment facilities
- Crushed rock surfaced yard, parking areas and roads
- Fencing and gating
- Landscaping with native plants where applicable
- Installation of equipment and structure foundations
- Subsurface grounding grids
- Subsurface conduit and raceway
- Installation of structures and equipment
- Installation of bussing materials
- Installation of control shelter
- Installation of control and relaying equipment and wiring

The maximum height of structures in the substation would be approximately 125 feet. The substation yards would be open air and could include transformers, circuit breakers, disconnect switches, lighting/surge arresters, reactors, capacitors, bus (conductor) structures, and a microwave antenna. In the case of the Mill Creek Substation a bank of phase shifting transformers to control electrical flows would be installed. The control shelter would be a structure approximately 50 feet wide, 100 feet long and approximately 12 feet high, and it would be constructed of conventional building material.

The substations would be designed and constructed in a manner to prevent and control accidental spills from oil filled equipment from affecting adjacent land uses. The ground level of the substation yard would be graded to direct the flow of water runoff away from equipment and the control shelter.

The yard would be covered with a layer of crushed rock (four or more inches thick) that would help inhibit flow of water or other liquids, and would serve as an absorbent in the event of an oil spill. Berms, or other barriers, would be used around the perimeter of the yard (along the fence line) to control runoff. Where needed, control areas such as retention ponds would be designed and constructed to contain runoff. Also, concrete containment pits would be constructed at the base of oil filled equipment to contain spills. These structures usually made of concrete would be designed to contain spills. If a large volume of oil were to leak from a piece of electrical equipment, an alarm or a failure would notify the operations center of the problem, and a trained maintenance crew would be dispatched to the substation immediately to begin repairs and cleanup. Oil Spill Contingency (OSC) plans and/or Spill Prevention, Countermeasure and Control (SPCC) plans would be developed for the new Townsend and Mill Creek substations and updated for the additions of the Midpoint Substation. These plans explain clean-up and emergency notification procedures specific to each substation. Also the substation facilities would be enclosed by chain link fence with a locking gates, site security system and adequate night lighting.

2.5.2.2 Townsend, Mill Creek and Midpoint Substation Construction Schedules, Workforce and Cost Estimates

Construction of the entire MSTI project is anticipated to take 32 months. Construction of the substations would be performed concurrently with the transmission line and with conventional construction techniques in accordance with NESC codes, OSHA, Institute of Electrical and Electronic Engineers, American Concrete Institute, and other industry-specific standards.

It is anticipated that substation construction and additions would be preformed with two contractors, one for Montana and one for Idaho. The total workforce that would be required to complete construction of the substations would be just over 110 workers. It is assumed that construction would occur during a 6 day work week.

Figure 2-12 illustrates the Townsend, Mill Creek and Midpoint construction work force requirements and duration for substation construction.

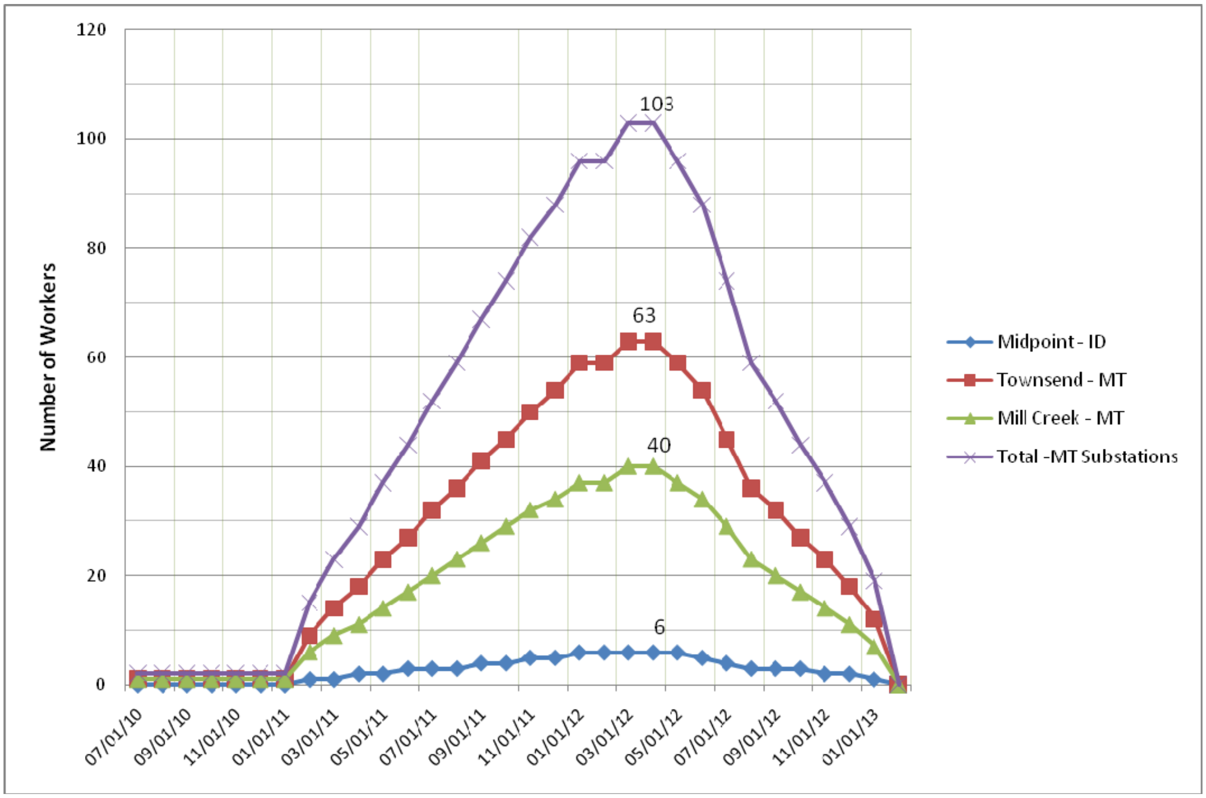

Figure 2-12 Estimated Workforce and Duration for Townsend, Mill Creek and Midpoint Substation Construction

New Townsend Substation

CONSTRUCTION SCHEDULE AND WORKFORCE

Site preparation would begin on about July 1, 2010, and conclude approximately February 2013. The construction workforce would peak at an estimated 63 workers in March and April 2012 (assuming 50-hour work week averages) as shown in Figure 2-12.

ESTIMATED COST

The estimated cost for labor and material to construct the new Townsend Substation is approximately $132 million in constant 2008 dollars. The estimate includes material costs and labor to install equipment, structures, foundations, site work, control shelter, grounding and conduit and cable. Other cost items in the estimate include, engineering, project management, procurement, construction management and testing, plus a 20 percent contingency.

New Mill Creek Substation

CONSTRUCTION SCHEDULE AND WORKFORCE

Site preparation would begin on about July 1, 2010, and conclude approximately February 2013. The construction workforce would peak at an estimated 40 workers in March and April 2012 (assuming 50-hour work week averages) as shown in Figure 2-12.

ESTIMATED COST

The estimated cost for labor and material to construct the Mill Creek Substation is $123.5 million in constant 2008 dollars. The estimate includes material costs and labor to install equipment, structures, foundations, site work, control shelter, grounding and conduit and cable. Other cost items in the estimate include, engineering, project management, procurement, construction management and testing, plus a 20 percent contingency.

Midpoint Substation Modifications

CONSTRUCTION SCHEDULE AND WORKFORCE

Site preparation would begin on about July 1, 2010, and conclude approximately February 2013. The construction workforce would peak at an estimated 6 workers in March and April 2012 (assuming 50-hour work week averages) as shown in Figure 2-12.

ESTIMATED COST

The estimated cost for labor and material to construct the modifications to the Midpoint Substation is $23.6 million in constant 2008 dollars. The estimate includes material costs and labor to install the equipment, structures, foundations, site work, control shelter, grounding and conduit and cable. Other cost items in the estimate include, engineering, project management, procurement, construction management and testing, plus a 20 percent contingency.

2.5.2.2 Substation Operation, Uses and Practices

The following sections present the typical operational characteristics, permitted uses, safety, maintenance, and abandonment practices that would apply to the Townsend, Mill Creek and Midpoint Substations. More specific practices may be developed after the facilities become energized.

OPERATIONAL CHARACTERISTICS

The new Townsend Substation, Mill Creek Substation and the modified Midpoint Substation are switching points containing: transformers, power circuit breakers and related line relay protection equipment for the new 500kV transmission lines. The protective equipment and switches in the substations safely isolates the transmission lines for line outages due to maintenance or forced outages due to faults.

PERMITTED USES

After the substation has been energized, land uses that are compatible with safety regulations would be permitted adjacent to the substation site. Existing land uses such as agriculture and grazing are generally compatible with a substation site. Incompatible land uses adjacent to a substation site include construction of facilities that would affect electrical clearances of existing or planned facilities coming into or out of the substation site.

SAFETY

Safety is a primary concern in the design and modifications of the 500kV substations (Townsend, Mill Creek and Midpoint). The substations will be protected with a secure perimeter fence containing the substation equipment (i.e. transformers, power circuit breakers, and related line relay protection equipment). If a failure occurs, lines associated with the fault would be automatically isolated. Lightning protection would be provided by overhead ground wires along the substation equipment. Electrical equipment and fencing at the substations would be grounded. If applicable, grounding outside of the substation sites may also occur.

MAINTENANCE

The 500kV substation sites would be inspected on a regular basis. The substation yards would be inspected monthly, requiring one person one work day to accomplish. Each gas circuit breaker would undergo routine annual inspections and maintenance, requiring three persons one work day to accomplish. The power transformers would receive annual maintenance taking two persons about one-half work day to complete. Capacitors would be maintained annually, requiring three persons one work day to complete.

Emergency maintenance would involve prompt movement of specially trained repair crews to repair and/or replace any damaged equipment.

ABANDONMENT

Abandonment of substation sites is unlikely and rare; however, at the end of the useful life of the proposed project, if the facilities were no longer required, the substation sites would be abandoned. Subsequently, substation equipment would be dismantled and removed from the sites. Foundations and rock covering would also be also removed.

Following abandonment and removal of the substation from the sites, any areas disturbed to dismantle the substation would be restored and rehabilitated as near as possible to their original condition.

2.6 ENVIRONMENTAL PROTECTION MEASURES AND SPECIFICALLY RECOMMENDED MITIGATION

2.6.1 INTRODUCTION

The MSTI project incorporates Environmental Protection Measures that NorthWestern would employ as necessary and appropriate, through project design, project construction and during operation and maintenance, to avoid or minimize environmental impacts and to protect the environment as standard practice for the entire project. Environmental Protection Measures have been incorporated into the project for general application on a nonspecific basis as part of the project description (refer to Appendix B for the measures that are part of the project description).

Specifically Recommended Mitigation is a list of measures or techniques that would be applied to mitigate specifically identified impact types or impact locations on a case by case basis after initial impacts are identified. The purpose of specifically recommended mitigation is to reduce the identified impact, resulting in a lower level of impact or what is referred to as residual impact (refer to Appendix C for the Specifically Recommended Mitigation).

The Environmental Protection Measures described in this document are preliminary measures that are part of the project description, but are not finalized or committed to until further discussions with the MDEQ are conducted. Likewise, the Specifically Recommended Mitigation Measures are preliminary, and not committed to by NorthWestern, until discussions are held on this subject with the MDEQ.

2.7 ALTERNATIVE ROUTE IDENTIFICATION AND EVALUATION

2.7.1 REGIONAL ENVIRONMENTAL SITING STUDY

INTRODUCTION

In late 2004, NorthWestern conducted an Open Season Process to identify potential interest for new transmission capacity from Townsend, Montana to the existing Borah or Midpoint Substations in Southwest Idaho, a distance of between 350-450 miles. Initially, over 2,000 MW of interest was requested by various generators, utilities, and other participants. The study process began with a feasibility study to determine what options there might be to export bulk power from Montana into southeastern Idaho.

Once completed, NorthWestern moved to the second stage of the process, which required a financial commitment by the participants. This stage of the process narrowed down the participant interest to 850 MW. Subsequent electrical studies conducted by NorthWestern examined the size of the line (i.e. 230kV, 345kV and 500kV) and the transmission upgrades in Montana to move the power from its sources to the northern terminal of the new line from Montana to Idaho.

An interconnection was to be evaluated from a point along the two circuits of the Colstrip 500kV line(s) in western Montana to either the existing Borah or Midpoint Substations in southeastern Idaho. Three alternative interconnection points were identified for evaluation on the Colstrip lines: Ringling, Townsend, and the existing Garrison Substation.

Ringling is an area in the approximate middle of the Colstrip lines between the Broadview Substation and the Garrison Substation. The Townsend site is south of Townsend, Montana and near the Missouri River. The ownership of the Colstrip lines change from NorthWestern to Bonneville Power Administration (BPA) in this area. The Garrison Substation is owned and operated by BPA.

In the fall of 2006, NorthWestern completed a regional siting study and preliminary engineering report for the Montana to Idaho pathway. The study included identifying alternative routes, various voltage options, AC vs. DC, design criteria, conductor and structure selection, and estimated costs for the various options. Out of this study the Townsend site was chosen for the northern terminus of the project, and Midpoint was selected for the southern interconnection.

The need for the MSTI project was then further refined in the second and third quarters of 2007 through a series of electrical studies, and the need to locate a phase shifter near the existing Mill Creek Substation was identified (refer to Chapter 1 – Purpose and Need). The change resulted in another point between Townsend and Midpoint that the line would need to pass through. Thus, alternative routes identified during the regional environmental study were refined, some alternative routes between the Townsend Substation site and Mill Creek were added, and some alternative route refinements between Mill Creek and the Midpoint Substation were added. Additionally, some of the alternative routes identified in the regional environmental study were dropped from further consideration because they no longer would be reasonable or feasible. These route refinements are described in the sections that follow.

The alternative routes identified through the 2006 regional environmental study and by refinement of the alternatives after the need for the phase shifter near Mill Creek in late 2007 are considered the reasonable and feasible alternatives evaluated in detail.

Identification of Alternatives

Through the 2006 regional environmental study (refer to Volume IV – Regional Study Report), approximately 1,372 miles of routing alternatives were identified as being reasonable and feasible between Townsend and Midpoint Substations. The regional environmental study of southwestern Montana and southeastern and southern Idaho was completed as part of NorthWestern's preparation of the Major Facility Siting Act (MFSA) application in Montana and similar studies performed voluntarily in Idaho. The environmental analysis completed during the 2006 regional environmental study and subsequent analysis in 2007 determined which alternative routes were reasonable and feasible to construct and operate. The alternatives were then evaluated in detail to facilitate comparing alternatives in this document.

The regional environmental study was begun in February 2006 and completed in November of the same year. The purpose of the study was to determine, as mandated and guided by the MFSA rules in Montana, NEPA (1969), implementing Council of Environmental Quality (CEQ) regulations (1978), MEPA rules in Montana, all reasonable and feasible transmission line routing alternatives connecting from the Townsend, Montana area to the Mill Creek Substation area in Montana, and Mill Creek to the Midpoint Substation area in Idaho. The study area encompassed about 25,000 square miles in the two states (Figure 2-13). Existing data, classified satellite imagery, and aerial imagery was used during the data collection process for the study area. The major resource disciplines evaluated included:

Natural Environment

- Threatened and endangered plant and animal species
- Wildlife habitat and use areas
- Plant habitat
- Soils and geology
- Surface hydrology

Human Environment

- Existing, planned, and designated land uses
- Parks, recreation, and preservation uses
- Scenic and aesthetic resources

Cultural environment

- Archaeology
- Prehistory
- Ethnohistory
- History

A sensitivity analysis was completed, and opportunities and constraints were determined to identify potential alternatives routes for the MSTI project. Sensitivity is the measure of the probable adverse response of each resource to direct and indirect impacts associated with the construction, operation, maintenance, and abandonment of the proposed transmission line. Criteria used in this determination included:

- **Resource Value**: A measure of rarity, high intrinsic value or worth, singularity or diversity of a resource within the study area or region.
- **Protective Status**: A measure of the formal concern expressed for a resource either through legal protection or by designation of special status.
- **Present or Future Uses**: A measure of the level of conflict based on policies of land management agencies and/or use.
- **Hazards**: A measure of the degree to which a resource represents a significant hazard to construction and/or operation of the proposed project.

These resources were then mapped according to their respective sensitivity level as follows:

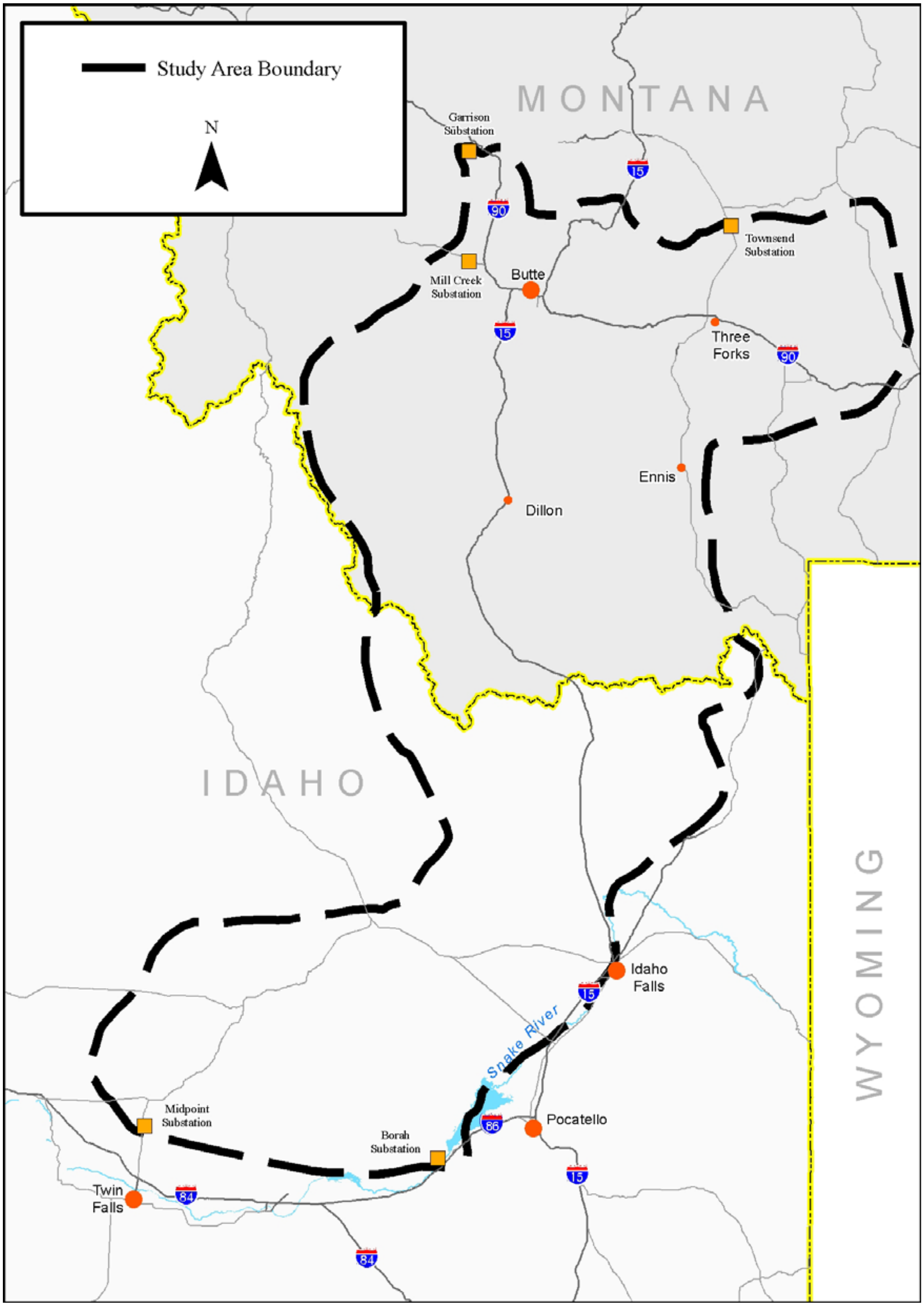

Figure 2-13 Study Area

- **Exclusion:** Areas where the siting of transmission lines is essentially precluded. This category includes:
  - areas which contain polices for legally protected resources (e.g. wilderness area, national park);
  - areas where government regulation expressly prohibits encroachment;
  - areas where ownership and use of the land preempts the siting of a transmission line; and
  - areas where there would be unacceptable hazards to the construction or operation of a transmission line.
- **High:** Includes areas which have the following characteristics:
  - unique, highly valued or complex resource areas;
  - significant potential conflict with a current or planned use;
  - areas possessing substantial hazards to construction and operation of a transmission line;
  - resource areas conflict with identified hazards typically requiring long term and costly mitigation or high design and construction costs;
  - areas which could require lengthy, complex review, and permitting requirements with likelihood of approval uncertain or low;
  - areas which have a high level of concern for potential high impacts to a resource;
  - mitigation is not likely to be effective in substantially reducing significant impacts;
  - resource is considered to be of exceptional value in its present or undisturbed state; and

  For the purpose of this study, areas designated as high sensitivity are considered to be the least desirable and should be avoided, if possible.

- **Moderate:** Includes areas which have the following characteristics:
  - the presence of resources that are important, valued and/or assigned special status;
  - resources with moderate (some) potential conflict with current or planned use;
  - limited hazards to construction or operation of a transmission line;
  - resource sensitivity is of concern but has a reasonable potential for mitigation to reduce high impact, depending on the severity of the impact; and
  - resources in this sensitivity level may in some instances be proposed for a specific land management designation, but have not officially been designated.

  For the purpose of this study, areas designated as moderate sensitivity are not considered to be highly desirable, but may be used with careful consideration of design, structure placement and the minimization of adverse impacts.

- **Low:** Includes areas which have the following characteristics:
  1. areas which have not been classified as exclusion, high or moderate;
  2. areas where, if permits are required, they are routinely issued;

3. areas with little or no conflict with existing or planned land uses;
4. areas with no cultural resources, no valued or special status biological or water resources; and
5. areas with no hazards to construction or operation of a transmission line.

After completing the sensitivity analysis for each resource, a composite sensitivity map was prepared through an overlay process using geographic information system (GIS) of all the resource sensitivity maps. The composite was used to identify constraints and locational opportunities resulting from combinations of the three level of environmental sensitivity for the five major resource areas: visual, land use, biology, earth, and cultural. Alternative corridor locations were then plotted taking into account the composite sensitivity, the locations of existing transportation and utility corridors, topographic constraints, and utilization of public lands. The corridor width varied somewhat to reflect the locations of constraining environmental features, yet allow sufficient margin for planning within each corridor. Corridors describe linear paths where:

- Features or areas of exclusion were avoided (e.g., residences, airstrips, well, and other sensitive land use features).
- Crossing of features or areas of avoidance was minimized.
- Locations through steep or rugged topography were minimized.
- Proximity to existing roads that could be utilized for construction and operation access was maximized.
- Locations parallel to existing transmission or existing utility corridors were maximized.
- Routing on private lands was minimized in favor of public lands.

Planners and engineers from NorthWestern, as well as project planners and engineers from the consulting firm, POWER Engineers (POWER), were present during and participated in the identification of alternative corridors. Based upon the environmental data available for the regional studies, the selection participants determined that all reasonable alternatives had been identified. The resulting alternatives in Montana are being presented to the MDEQ for review in this MFSA application, and in the subsequent ER to the local, State, and Federal agency officials.

Approximately 1,372 miles of alternatives were identified in the 2006 regional study and subsequent refinements in 2007 (refer to Volume IV – Regional Study Report and Figure 2-14). The initial alternatives identified in the regional study and the subsequent 2007 need and alternatives refinements were reviewed through numerous field and aerial surveys by the environmental and engineering teams. The objective of the field reviews were to refine the broad “corridors” of the alternatives, and to delineate assumed centerlines based on environmental and engineering input, and to further the familiarity of the study team with the environmental, physiographic, and engineering characteristics of the study corridors. These assumed centerlines formed the basis for the study area for each alternative route that is the subject of environmental review in this document and the subsequent joint State of Montana and Federal EIS. The field review and delineation of the assumed centerlines was completed in the period of April 2007 to March 2008.

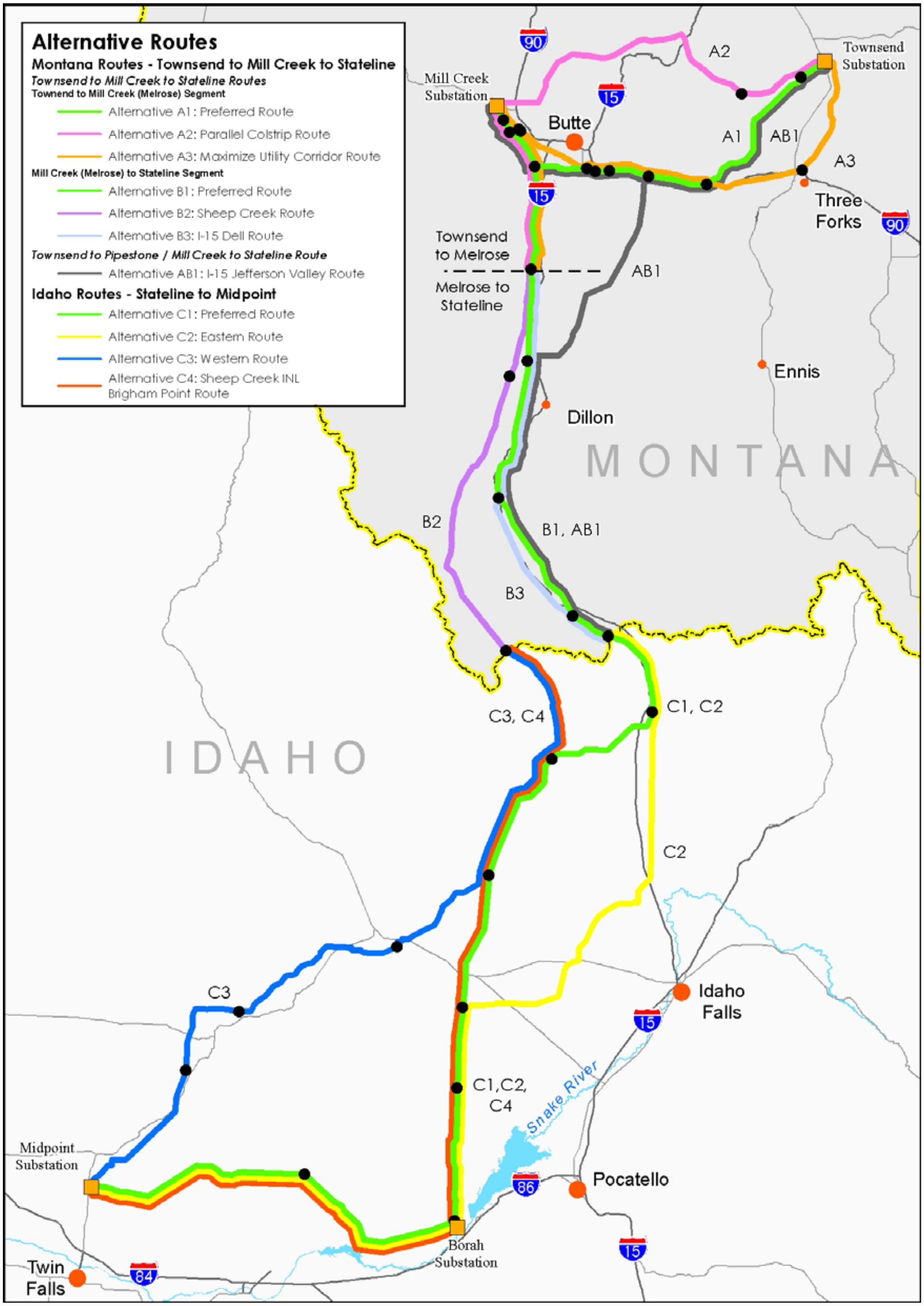

Figure 2-14 Alternative Routes

After a series of public meetings (refer to Chapter 5 – Consultation and Coordination), elected official meetings, and meetings with local, State, and Federal agencies, intended to meet the MFSA requirements and determine preliminary issues to be addressed in this document, the identified reasonable and feasible alternatives were evaluated in detail. The results of the route evaluation are documented in the MSTI project files and the in the MSTI Regional Siting Study report (POWER, 2006). Please refer to Volume IV – Regional Study Report.

Develop Scope/Preparation Plan

A Scope/Preparation Plan was developed for the environmental documentation process. This plan considered the following:

- Previous environmental studies, reports, and EISs.
- Resource Management Plans of the BLM offices of the Butte and Dillon Field Offices in Montana.
- Land and Resource Management Plans of the Beaverhead-Deerlodge National Forests in Montana.
- Issues and alternatives resulting from the regional siting studies.
- Input from the agency contacts and public meetings, toll-free telephone comments, and website comments.
- MFSA substantive reporting requirements
- Montana MEPA and Federal NEPA requirements (NEPA, 1969 and CEQ regulations, 1978).

2.7.2 Detailed Corridor Studies

Following completion of the regional siting study in 2006, and agency and public input, the over 1,300 miles of alternative corridors were studied in detail (refer to Figure 2-14). The study areas established along the assumed centerline of each alternative ranged in widths from two to ten miles depending upon the needs of, and concerns for, each resource discipline and the substantive requirements of the MFSA (refer to the discussions of study corridor widths in Chapter 4).

Following the identification of final alternative routes, the environment was inventoried for nine resource categories to establish current environmental conditions. This baseline was then used to determine where and to what extent impacts from the project might occur. The nine inventoried resource categories were organized as follows:

Natural Environment

- Air Quality and Meteorology: air quality, climate
- Earth Resources: geology, hydrology, springs, water quality, soils, and paleontology
- Biological Resources: terrestrial vegetation, rare, threatened or endangered plants, wildlife, and aquatic species, floodplains, wetlands, and associated vegetation, sensitive plant and wildlife habitat

Human Environment

- Land Use: land jurisdiction, existing and future uses, parks, recreation, preservation areas, range lands and improvements, mineral resources
- Visual Resources: scenic resources, visual sensitivity, BLM visual resource management (VRM) classes, FS visual quality objectives (VQO) or Scenic Integrity Objectives (SIO) classes
- Socioeconomics: demography, economy, employment, tax jurisdictions, and community resources

Cultural Environment

- Prehistory: known and expected / probably prehistoric resources, for example lithic sites, tool or dwelling sites, etc.
- History: historic sites, trails, structures
- Ethnology: Native American religious and ritual sites, and hunting and gathering sites

These data provided the baseline for identifying potential impacts and appropriate mitigation measures, both generic and specific. Further, these data form the basis for the comparison of the routing alternatives. Specific mitigation measures, recommended on a case-by-case basis to reduce or eliminate specific impacts, determined the residual, or unavoidable adverse, impacts to the environment along each alternative route. Detailed results of the inventory, impact assessment, and mitigation planning are provided in the attached technical reports (see Volume II – Technical Reports).

The assessment of environmental impacts is based upon an assumed (or reference) centerline for the proposed transmission line. Impacts identified in this document were assessed assuming maximum movement of 500 feet from the assumed centerline for the final engineered right-of-way.

The detailed corridor studies were initiated in the summer of 2007. The collection of detailed environmental data for the resource areas is previously described. The inventory of resource data involved contacts with Federal, State, and local agency resource specialists and land managers. The data collected, mapped, and field verified by POWER resource investigators will be reviewed by MDEQ for compliance with the substantive requirements of the MFSA. In addition to the environmental resources, electric and magnetic field (EMF) effects have been analyzed for the MSTI project.

The planning process used for the MSTI project applied advanced computer technology in the form of GIS to collect, map, analyze, and manage the voluminous data collected for the inventory. The data collected by resource investigators were supplemented by classified satellite imagery, aerial imagery, and many other available data sources. GIS was also used during the impact assessment and mitigation planning process to uniformly assess impacts and apply mitigation to specific impact locations. The GIS applied a variety of models developed by the resource team to evaluate and assess the potential impacts of the MSTI project. Assumptions for project construction and ground disturbance are found in Chapter 1 and in Appendix D.

These data provided the baseline for identifying impacts, preliminary mitigation measures, and comparing the routing alternatives. Detailed results of the inventory, impact assessment, and mitigation planning are provided in the technical reports (refer to Volume II – Technical Reports).

2.7.3 ROUTING ALTERNATIVES EVALUATION PROCESS

Routing Alternative Considered and Eliminated

Several adjustments, modifications, and additions to the alternative routes were made following the regional siting study and during the detailed corridor studies. These refinements, additions, and deletions were made after receiving public input and following electrical system studies conducted by NorthWestern in 2006 and 2007. Prior to being added to the MSTI reasonable alternatives, the added alternative routes were screened for environmental and engineering feasibility using regional siting study data and field investigations.

Following the regional siting study (February 2007), the Ringling interconnection point and the Garrison interconnection point were removed from further consideration by NorthWestern for business and electrical reasons. The Ringling alternative routes were eliminated, and these consisted of Ringling to Townsend along the Colstrip corridor, the Ringling to the Bradley Creek Substation area north of Ennis Lake, and Ringling south into the existing 161kV and 230kV transmission corridor and then west to the Three Forks area. These eliminated alternatives are displayed on the Alternatives Considered But Eliminated map in Volume IV of this document.

Likewise, the Garrison Substation was eliminated from further consideration in February 2007 when the Townsend Substation site was selected. Routes eliminated at this time included a route between Garrison Substation and the Mill Creek Substation area. A route parallel to the existing 100kV transmission line between Helena and Butte identified during the siting study was also eliminated because the developed area and rugged terrain north of Butte would prohibit a line from going west towards Mill Creek on the north side of Butte. Another route from the regional siting study that extended between the Jefferson Valley northwest of Twin Bridges to the Big Hole drainage between Melrose and Glen was also eliminated because a route straight south of Twin Bridges into the area north of Dillon was identified to eliminate the need for the east – west connection.

Once the detailed corridor studies began in April 2007, the public outreach began with public meetings and elected official briefings. In June 2007, a public meeting was held in Ennis, and it was determined that public opposition to the line was intense. In addition, much of the Madison River valley is blocked with conservation easements. In October 2007, the decision was made by NorthWestern to connect from Townsend to Mill Creek and then south to Midpoint Substation in Idaho. Because of the routing difficulties to a minor extent, and because the routing this far east in the Madison River valley no longer made any sense for a southern route from Mill Creek to Idaho, the remaining routes in the Madison River valley, the Centennial River valley, between Ennis and Dillon, south of Dillon along the Blacktail Deer Creek valley, and from Billings Creek area along the 161kV and 230kV transmission line corridor into the Ennis area were eliminated from further consideration in October 2007.

Refinements to the routing alternatives occurred in February 2008 when POWER evaluated the specific alignment of the various remaining alternatives routes. These refinements occurred in the Clark Canyon Reservoir area along the Beaverhead River. A refinement was also made just south of Clark Canyon Reservoir in the Red Rock River area for a better crossing of I-15.

The alternative routes in the south Butte area from Highview to Mill Creek were refined between January and May 2008 as the project description was adjusted to rebuild some of the existing lines and specific widths of rights-of-ways and requirements for the new line were determined.

In May 2008, the routes between the southern Elkhorn Mountain area to Pipestone through the Boulder River valley and the Hadley Park area was eliminated during the route selection process due to public opposition and rugged terrain.

The link segment crossing through the BLM managed lands of the Craters National Monument was eliminated from further consideration in June 2008 after review by legal staff. It is not considered reasonable to further evaluate this alternative because the enabling legislation prohibits such entry.

There are significant reliability concerns for the MSTI alternative routes in the major utility corridors adjacent to the two 500kV Colstrip transmission lines and in the corridor between the Borah Substation area and Midpoint Substation in southern Idaho. Simply stated, adding major transmission lines in corridors with other major transmission lines are problematic and could create situations where the electrical grid of the western U.S. is threatened. The WECC standards for major new parallel lines would require significant separation (up to 1,800 feet) to allow operation of the line the way it is intended. These reliability concerns are discussed in greater detail in Chapter 1.

Analysis Process

GIS was employed to assist in the preparation of the environmental analysis in this MFSA application. The GIS was used to evaluate issues and help identify alternative transmission line corridors during the regional siting study, and during the detailed corridor inventories and impact assessment/mitigation planning. The following summarizes the sequence of GIS applications for the MSTI:

- Collecting and downloading resource inventory data.
- Digitizing resource inventory data as collected and recorded by resource principal investigators.
- Conversion of paper maps to digital database format.
- Developing models to establish the expected level of ground disturbance associated with construction activities, the potential increase in public access into remote areas, and the degree of visible change in the landscape.
- Developing impact models to evaluate how the construction and operation of the proposed project would affect resource values and features.

- Producing impacts maps that graphically illustrate both the location and magnitude of potential resource impacts.
- Developing and producing tabular impact data reports that describe the resources crossed, and the location and magnitude of potential impacts along the assumed centerline of alternative transmission line routes.
- Summarizing and comparing alternative routes for documenting impacts along each route, and selection of NorthWestern's preferred route.

The Townsend Substation, Mill Creek Substation (for location of the phase shifter), the expansion of the Midpoint Substation, and communication facilities were also evaluated during the environmental studies (refer to Chapters 3 and 4, and the appendices). Please refer to the complete project description in this chapter for the requirements of the communication facilities.

The proposed project's purpose and need statement (refer to Chapter 1), public issues, and agency concerns guided identification and evaluation of alternatives. An environmental study process was developed and implemented to ensure a systematic, uniform, and defensible framework for identifying, assessing, and comparing alternatives routes for the proposed transmission line (also refer to Volume IV - Regional Study Report for documentation of the regional siting study).

The access and construction requirements determined the amount of potential ground disturbance (i.e., constructing new roads or improving existing roads, spur roads from existing roads, material and equipment staging areas, pulling and tensioning sites, and construction work areas around each structure site). Access level models estimate the ground disturbance (temporary and permanent) for these areas affected by the construction and operation activities (refer to Table 2-2 and Appendix D for a description of the estimated disturbance levels). Vegetation removal requirements were also considered.

2.7.4 Comparison of Routing Alternatives

Preferred route selection was based upon the comparison of alternatives routes in three route segments:

1. Townsend Substation south of Townsend, Montana to the Mill Creek Substation southeast of Anaconda (the common end point used to compare alternatives is south of Mill Creek and is referred in this document as Melrose).
2. Mill Creek Substation (Melrose) and Montana/Idaho border in the Monida Pass and Sheep Creek areas and on the Continental Divide.
3. Montana/Idaho border to Midpoint Substation near Shoshone, Idaho.

Two alternative routes and NorthWestern's Preferred Route were identified and compared in this document between Townsend and Mill Creek; two alternative routes and the Preferred Route between Mill Creek and the Montana / Idaho border. Also identified and compared is an alternative route from Townsend to Mill Creek along the Preferred Route, but with a switching station at Pipestone where the route would continue south to the state line through the Jefferson Valley and along I-15.

Four alternative routes and NorthWestern's Preferred Route were identified and compared between the Montana / Idaho border and Midpoint Substation. The Idaho alternatives routes are not presented in this MFSA Application document, but the maps and technical reports address all alternative routes that were considered in detail.

To assist in the determination of routing preferences, the environmental consequences for each route were summarized based on the residual impact assessment results (i.e., after specifically recommended mitigation measures), specific resource preferences, and agency and public comments received during the agency and public outreach from April 2007 to May 2008. A reasonable number of the best environmental routing alternatives were determined from combining individual links to make complete routes (as described above).

Subroute sets are made up of localized alternatives that have common beginning and end points. Subroutes were evaluated in order to further reduce the potential number of routes that could be derived from the network of reasonable link segments. The link segments eliminated during this process were studied in detail, but because of greater overall impacts than other similar link segments they were eliminated from further consideration in the route comparisons. Appendix E contains graphics of the subroutes and data used in the comparison to help derive the alternative routes compared in this document. The link segments where no local routing decisions were necessary were termed connectors.

The environmentally preferred subroute within each set of subroutes was selected and combined with connector links to form alternative routes between the fixed endpoints of Townsend, Mill Creek, and Midpoint. The subroute selection process was conducted using a facilitated two-day consensus-building process with the POWER study team and managers from NorthWestern. The team's principle investigators represented their resource. The impacts were evaluated and the least impact and most publicly acceptable alternative was identified by the team, and was used in NorthWestern's selection of their Preferred Route at the end of the two-day process. This process is further described in Appendix F of this document.

Montana

Townsend to Mill Creek to State Line Routes

Townsend to Mill Creek (Melrose) Segments

A1: Preferred Route – Links 1, 3-1, 7-2, 7-41, 7-42, 7-5, 7-8, 11-22, 11-21, 7-9, 11-23

A2: Parallel Colstrip Lines Route – Links 1, 4-1, 4-2, 7-9, 11-21, 11-22, 11-23

A3: Maximize Utility Corridors – Links 1, 3-1, 7-2, 7-41, 7-42, 7-5, 7-8, 11-22, 11-21, 7-9, 11-23

Mill Creek to State Line Segments

B1: Preferred Route – Links 11-3, 16-1, 16-2, 16-4

B2: Sheep Creek Route – Links 11-4, 18-1

B3: I-15 Route – Links 11-3, 16-1, 16-3, 16-4

Townsend to Pipestone/Mill Creek to State Line Route

AB1: I-15 Jefferson Valley Route – Links 1, 3-1, 7-2, 7-41, 7-42, 7-5, 7-8, 11-22, 11-21 ,7-9, 8, 16-1, 16-2, 6-4

Idaho

C1: Preferred Route – Links 20, 22, 23, 24, 26-1, 26-2, 26-3, 26-4, 27

C2: Eastern Route – Links 20, 21, 26-1, 26-2, 26-3, 26-4, 27

C3: Western Route – Links 18-2, 23, 25-11, 25-12, 25-3, 25-4, 27

C4: Sheep Creek INL Brigham Point Route – Links 18-2, 23, 24, 26-1, 26-2, 26-3, 26-4, 27

The following section describes various issues and resource preferences for each route compared. Environmental data and specifically recommended mitigation is shown in Volume II – Technical Reports.

Route Descriptions

Townsend to Mill Creek (Melrose) Segments

Alternative A1: Preferred Route – This route would go south out of the new substation in Broadwater County, then west to cross the Missouri River and between several parcels of center-pivot irrigated lands, turning southwest between Radersburg and Parker, then entering Jefferson County. The route would continue southwest for nearly 10 miles crossing undeveloped range lands before turning south along the east side of the foothills forming the east side of the Boulder Valley. The route turns to the west crossing through Negro Hollow just north of Doherty Mountain on the approach, and crossing the Boulder River north of Cardwell. North of Cardwell the preferred route would cross a partially developed platted subdivision.

From here, the route would join the existing 230kV and 161kV corridor and travel west along the north side of the existing corridor, north of Whitehall and Pipestone, crossing along the edge of two partially developed platted subdivisions.

The route would pass through more rugged and undeveloped terrain on the north side of I-90 to the Highview area, and then cross into Silver Bow County into the South Butte area. South of Butte there would be visual impacts from existing residences, and several platted subdivisions would be crossed. The route would continue straight west to the south side of Newcomb diverging from the existing transmission line corridor from the Newcomb area to Buxton. East of Buxton the line would cross an area of subdivided lands. From the west side of Buxton the line would turn sharply to the north-northwest parallel to the existing 161kV and 230kV transmission line corridor. The route from Buxton to Mill Creek would be a double circuit 500kV line as it would pass southwest of Fairmont and into Mill Creek.

Biologically, the route passes through a high priority wildlife movement corridor along the I-15 corridor from Buxton to Divide. The second highest amount of winter habitat for mule deer, elk, and moose are scattered through the valleys along A1. Sage grouse habitat is limited and no leks are known within 2 miles of the proposed line. High avian use areas along the preferred route are limited to riparian corridors primarily associated with the Missouri River.

The route south from the double circuit segment west of Buxton would follow the existing 161kV and 230kV transmission corridor, passing west of Woodin and Divide. The route would continue to the crossing of the Big Hole River from the east to west sides, and then on south to just west of Melrose, the point where the 161kV line and the 230kV line split on the existing corridors south to Idaho. For purposes of the route comparisons this point was chosen as a common point.

Alternative A2: Parallel Colstrip Lines Route – This route would begin at the new Townsend Substation in Broadwater County going south, then west to cross the Missouri River the same as Route A1, and between several parcels of center-pivot irrigated lands, then west southwest north of Radersburg. The line would then cross into Jefferson County south of and parallel to the existing double circuit 500kV Colstrip line, but with an 1,800 feet separation to meet reliability requirements of the WECC to separate the backbone transmission lines to help reduce the potential of a simultaneous outage of multiple EHV transmission circuits.

The line would continue westerly across the southern toe of the Elkhorn Range paralleling the Colstrip line crossing through the corner of the Beaverhead-Deerlodge National Forest, then northwest towards the Boulder River valley crossing the river and I-15 in a developed subdivision, then west past Comet crossing through forested lands of the Beaverhead-Deerlodge National Forest. The route would diverge from the Colstrip line near the Powell – Jefferson County line, then southwest through the Beaverhead-Deerlodge National Forest and then cross into Silver Bow County southeast of Warm Springs. The route would run straight west into the Mill Creek area on the north side of Opportunity and through several largely undeveloped subdivided lands.

Biologically, A2 is similar to A1 with slightly higher amounts of winter habitat for mule deer and moose. The route crosses considerable more summer elk habitat along the northern portion of the project area through the Beaverhead National Forest. The route crosses the lowest amount of wildlife movement corridor.

Alternative A3: Maximize Utility Corridors – This route would exit the proposed Townsend Substation to a point on the east side of the Missouri River valley, and then south along the foothills. The route would pass just at the toe of those foothills avoiding conflicts with the agricultural lands in the Missouri River valley, then cross the Missouri River west of Brewer. The route would continue south along the existing 100kV line and through a series of lands under the Conservation Reserve Program (CRP). The route would continue to follow the toe of the foothills on the west side of the Missouri River valley and diverge from paralleling the 100kV line west of Clarkson, joining the existing 161kV and 230kV transmission line corridor several miles west of NorthWestern’s existing Three Rivers Substation.

From this point the route would follow along the north side of the existing corridor passing west through a series of undeveloped subdivided lands and lands under the CRP, parallel to I-90 and crossing it near the intersection of US 287. The route would cross into Jefferson County and would continue west to cross through subdivided lands and lands under the CRP before crossing through a canyon through the south side of Doherty Mountain.

The route would cross back to the north side of I-90 and the Boulder River north of Cardwell, and then join the route described above for the A1: Preferred Alternative between the Cardwell area and to the south of Butte.

The route would then cross into Silver Bow County and into the south Butte area. South of Butte there would be visual impacts from existing residences, and several platted subdivisions would be crossed. Visual impacts would continue as this route continues to follow the existing corridor on the north side and then turns to the northwest towards Mill Creek. It would cross the Silver Bow Industrial Park and pass south of Ramsay, Dawson and Miles Crossing. Many residences in this area would have significant visual impacts.

The route would then pass north of Finlen and south of Crackerville along the existing transmission corridor. The final three miles into the Mill Creek Substation would parallel the existing corridor as a double circuit line, that is, the circuit into Mill Creek and the circuit out of Mill Creek traveling south.

The route from Mill Creek south would be identical to that described above for the A1: Preferred Alternative except it would be a single circuit 500kV line instead of the double circuit described above for the Preferred Alternative from Mill Creek south to Buxton. The single circuit would continue south along the route described above for the Preferred Alternative between Buxton and Melrose.

Biologically, A3 would be the route with the least impacts. The route crosses the lowest amount of winter big game habitat, summer elk habitat, avian use areas, and sage grouse habitat.

Mill Creek (Melrose) to State Line Segments

Alternative B1: Preferred Route – From the Melrose area, this route would continue south along the 161kV transmission line generally parallel to and west of I-15 on the western edge of the Big Hole valley and in a designated utility corridor where public lands managed by the BLM would be crossed. Some agricultural lands would be crossed as well as one platted subdivision under construction near Apex. The route would continue south along the east side of the 161kV line through the foothills northwest of Dillon, past the existing Dillon Substation. Southwest of Dillon the line would cross on the west side of agricultural lands with many center-pivot irrigation systems present.

The route would cross I-15 north of the Dell area and diverge to the east of the existing 161kV line and into the foothills on the east side of I-15. To avoid rugged terrain on the east side in the area of Pipe Organ Rock, the route would conflict with wetland and riparian areas north of Clark Canyon Reservoir where the existing line crosses I-15 from west to east. The route would again join the corridor of the existing 161kV line in the hills on the east side of I-15.

The route passes through the highest amount of high priority wildlife movement corridor along the I-15 corridor from Buxton to Divide and further south around Dell and Lima. The highest amount of winter habitat for mule deer and pronghorn are scattered through the valleys along B1. High quality sage grouse habitat occurs through the sage hills with several leks within 2 miles of the proposed line. High avian use areas along the preferred route are primarily associated with river corridors and the Clark Canyon Reservoir.

South of the Clark Canyon Reservoir, the existing 161kV transmission line again crosses I-15 from east to west, and the alignment of this route would simply continue south in the hills on the east side of I-15. The route would continue south on the east side of the Red Rock River past Dell avoiding agricultural lands with center-pivot irrigation systems in the river valley and in the corridor expected to be approved in the Westwide Corridor Programmatic EIS being finalized by the BLM. The route east of Dell would also avoid conflicts with the Dell airport.

This route would cross I-15 from the east to west sides south of Dell to parallel the existing 161kV line again to Monida Pass and the Montana-Idaho border.

Alternative B2: Sheep Creek Route - This route would run south from Melrose parallel to and on the west side of the existing 230kV transmission line. It would cross over a small area of irrigated agricultural lands at Rock Creek and near an area of subdivided land on the east side of Humboldt Mountain. It would pass by several residences in the Rattlesnake Creek drainage several miles west of Dillon.

The route would continue south through rugged terrain on the west side of the Clark Canyon Reservoir, and would cross a small area of agricultural lands at the mouth of Medicine Lodge Creek. This drainage would be followed as the route would continue south parallel to the existing 230kV line past Medicine Lodge Peak and up the drainage divide between Medicine Lodge Creek and Sheep Creek. The route would continue to follow the 230kV line south in the Sheep Creek drainage and a two-track road to the Continental Divide and the Montana–Idaho border.

Several of the agencies have expressed significant concern about this route because of the important wildlife movement that occurs in this area facilitating large mammals and forest carnivores to move between the Greater Yellowstone Ecosystem to the mountains in central Idaho through the Centennial Valley. Biologically, B2 is similar to B1 with slightly higher amounts of wildlife movement corridor along the Big Creek Basin. The Big Creek Basin also supports several special status plant and animal species. Winter habitat for elk is the highest along B2. Mule deer and moose winter habitat would be less than B1. The route crosses highest amount of sage grouse habitat and has the highest amount of leks in proximity to the line.

Alternative B3: I-15 Route - The descriptions for this route are the same as the Preferred Route from Mill Creek to just south of the Clark Canyon Reservoir where this route would continue to follow the existing 161kV line to the west side of I-15. It would cross an area of residences, then cut through agricultural development in the Red Rock River valley past Dell and still on the west side of I-15. Near Dell the route would cut through center-pivot irrigation and would result in conflicts with the airspace of the Dell airport. South of Lima, the route would again be the same as the B1: Preferred Route described above.

The agencies strongly favor this route because of the established corridor along I-15, which includes the 161kV transmission line. The Westwide Corridor Programmatic EIS is expected to designate a new corridor in this area in the low foothills east of the Red Rock River valley.

Biologically, B3 would be the route with the least impacts. The route crosses the lowest amount of winter big game habitat, summer elk habitat, avian use areas, and sage grouse habitat.

Townsend to Pipestone / Mill Creek to State Line Route

Alternative AB1: I-15 Jefferson Valley Route – This route would be the same as that described for the A1: Preferred Route from Townsend to Mill Creek and from Dillon south to State Line. The route would not proceed south from Mill Creek along the existing 161kV or 230kV transmission line corridors like the A and B routes described above. Instead this route would require a switching station near Pipestone and the line would connect from Pipestone to the Mill Creek Substation along the Preferred Route, and the impact descriptions would be the same as the Preferred Route from Pipestone to Mill Creek. It would proceed south from Pipestone along the western edge of the Jefferson River valley mostly away from rural residential areas in the valley.

The route would not cross through major land uses through this valley from Silver Bow into Madison County. Visual impacts would occur to residences northwest of Whitehall. The Big Hole River would also be crossed northeast of Dillon in a relatively remote area near the Hogback Ridge.

Townsend Substation

This would be the new substation located south of Townsend in Broadwater County on private lands currently being used for agricultural production. Visual impacts would occur to highway travelers along US 287 as a result of the new substation being constructed. Agricultural productivity of the land that would be occupied by the substation itself and the transmission line routes leaving the station to the south (Preferred Route and Parallel Colstrip Route) would be lost or comprised due to conflicts with the center- pivot irrigation system that the transmission line would pass through. Middleground visual impacts to residences in the Missouri River valley would also occur as a result of the new substation being built at Townsend.

Mill Creek Station

A new yard adjacent to the existing Mill Creek Substation would be required to place the phase shifting transformer. The site is currently in non-utilized open space that is considered industrial use. No identifiable impacts would occur to any resource except for the permanent loss of grasslands that would be removed for the new facility. The new facility would not electrically interconnect with the existing Mill Creek Substation.

Communication Facilities

As discussed in Section 2.3.2.1, preliminary locations for microwave facilities along the Preferred Route have been identified (see Figure 2-4). The microwave site locations in Montana include Mill Creek, Fleecer, Beef Trail, East Ridge, Cardwell Hill, the Townsend Substation, and Mauer Mountain. All seven microwave site locations in the state are either existing or designated communication sites.

Of the seven proposed microwave site locations in Montana, only three – Cardwell Hill, Fleecer, Mauer Mountain – would require tower construction, building placement, or fencing. None would require new access roads. Because of the pre-existing development at these locations, no adverse effects would occur from construction, operation, or maintenance of the communication system.

2.7.5 IDENTIFICATION OF PREFERRED ROUTE

Townsend to Mill Creek

The Preferred Route (A1) is more compatible with BLM and FS visual management than the other two alternative routes from Townsend to Mill Creek, and has the least miles of significant visual impacts. The worst route for compliance with visual management is the A2: Parallel Colstrip. All of the routes would cross a Class II Fishery at the crossing of the Missouri River, would cross waterfowl production areas on the Missouri River. Similarly, all would cross the Lewis & Clark National Historic Trail (i.e., at the Missouri River crossings) and the Continental Divide National Scenic Trail (A1: Preferred Route and A3: Maximize Corridor Route at Highview and A2 on the Powell – Jefferson County line northeast of Warm Springs). The Pipestone Mining District is highly sensitive for both prehistoric and historic archaeological sites. Also refer to Table 2-5 for additional comparative information for the route alternatives.

Impacts are least to residences and direct impacts to subdivided lands on the Preferred Route. The A2: Parallel Colstrip Route would have these types of impacts to residents of Opportunity, Radersburg, and the developed and subdivided lands north of Boulder. Visual impacts to the Black Sage WSA would occur from the Preferred Route being located nearby. The greatest numbers of documented archaeological and architectural sites are located along this route, as are the greatest number of sites determined eligible to the National Register.

The A3: Maximize Utility Corridors route would have land use impacts crossing the subdivided and developing lands in the I-90/US 287 area on both sides of I-90, an area designated by policy of Broadwater County as future development. Despite maximizing the use of existing transmission line corridors to parallel, this route is the worst of the alternatives compared for land use impacts. This route would also result in significant visual impacts in the south Butte area and southwest of Ramsay despite being in an existing corridor. This route would have the most miles of significant visual impacts of the routes compared.

Land use impacts to residences and residential areas in the south Butte area are common to the A1: Preferred Route and A3: Maximize Utility Corridors route. Likewise the visual impacts are common to these alternatives. Both of these routes would also result in potential impacts to future operations planned at the Burt Mooney Airport in Butte and would require review by the FAA. Consultation with the Bert Mooney Airport as well as the Whitehall Airport would be required to determine appropriate mitigation. South of Mill Creek, these two routes would cross a conservation easement near to the Mount Hagen Wildlife Management Area.

The A2: Parallel Colstrip alternative would require cutting a new corridor through forest lands on the Beaverhead-Deerlodge National Forest because of the 1,800 feet of separation required for reliability and to secure the line rating from the WECC. The Colstrip line through the Beaverhead-Deerlodge National Forest has never been designated a utility corridor, thus the line in this route across National Forest System lands would not be within a designated utility corridor. This route would also cross through a significant resource area in the southern part of Elkhorn Mountain where the Beaverhead-Deerlodge National Forest is proposing special management areas, including an ACEC designation to protect cultural resources.

Table 2-5 Alternative Routes Comparison

Montana Routes	Alternative Routes	Links	Length (miles)	Cost (millions of dollars)	Ground Disturbance Estimates (acres)		Environmental Impacts: Visual Impacts		Biological Resources		Soil Erosion	Land Uses						Cultural Resources	Water Resources	Public Acceptability	Notes
					Temp	Perm	Impact Level (miles)	Visual Mgmt Compliance	Impact Level (miles)	Migration Corridors and Habitats	Impact Level (miles)	Impact Level (miles)	Houses within 1000 feet	Houses within 500 feet	Corridor Utilization	Subdivisions Crossed	Other Direct Conflicts	Impact Level (miles) and Comment	Number of Stream Crossings (perennial)		
Townsend to Mill Creek (Melrose)	**Alternative A1 Preferred Route**	1,3-1,7-2,7-41,7-42,7-5,7-8,11-22,11-21,7-9,11-23	113.1	157.5*	509	407	M - 63.2 H - 26.9	No 8.5 miles	M - 87.0 H - 0.9	Very high- and low-priority migration corridors crossed; waterfowl production at Missouri River crossing, big game winter habitat	M - 33.9	M - 19.4 H - 2.0	90	22	Best balance between minimizing impacts and using corridors	Subdivided land north of Cardwell; several crossings of subdivided lands from south Butte area and Buxton; subdivision near Divide		H - 2.1 Pipestone Mining District along Link 7-2	27	Least public and agency concern	Least miles of significant visual impacts; least overall impact between Townsend and Mill Creek
	Alternative A2 Parallel Colstrip Route	1,4-1,4-2,7-9,11-21,11-22,11-23	135.6	135.6*	537	538	M - 77.1 H - 27.6	No 18.1 miles	M - 105.6 H - 3.2	Tree clearing across the Beaverhead Deerlodge National Forest would be concern for classic habitat fragmentation; waterfowl production concern at Missouri River crossing, summer elk on forest	M - 50.5	M - 29.0 H - 1.9	32	8	No designated utility corridor by Beaverhead Deerlodge National Forest; requires 1800 feet separation from Colstrip lines for reliability	Crosses developed subdivision north of Boulder; subdivision near Divide		H - 2.6 Greatest number of documented and eligible cultural resources	56	Crosses through developed area north of Boulder	Most soil erosion hazard; highest impact to water resources
	Alternative A3 Maximize Utility Corridor Route	2-1,2-3,7-2,7-41,7-42,7-5,7-61,7-62,7-72,7-9,11-21,11-22,11-23	128.8	144.3*	573	460	M - 70.7 H - 31.5	No 8.7 miles	M - 77.6 H - 0.7	Very high- and low-priority migration corridors crossed; waterfowl production at Missouri River crossing, big game winter habitat	M - 37.0	M - 21.7 H - 2.6	132	38	Most miles of parallel to existing transmission lines	Subdivided lands south of Butte and from here to Mill Creek; Buxton area; subdivision near Divide		H - 3.0	31	Concern for developing area in Broadwater County near I-90 and Highway 287	Most visual impacts
Mill Creek (Melrose) to State Line	**Alternative B1 Preferred Route**	11-3,16-1,16-2,16-4	87.2	103.9*	384	377	M - 35.6 H 13.2	Yes	M - 64.9 H - 10.2	Within I-15 corridor which will reduce concern for wildlife movement corridors; waterfowl production area north of Clark Canyon Reservoir on Beaverhead River, quality sage grouse habitat and lekking areas	M - 26.9	M - 5.2 H - 1.9	9	2	Corridor preference of agencies; I-15 helps establish this corridor as already impacted; Westwide Corridor Programmatic EIS expected to match alignment east of Red Rock River valley	Subdivision crossed at Apex and Lima	Crosses fishing access site on Link 16-1; conservation easement north of Clark Canyon Reservoir	H - 0.6	14	Strong agency preference	Visual impacts similar on all alternatives; crosses Class A scenery on Big Hole River
	Alternative B2 Sheep Creek Route	11-4,18-1	86.9	103.3*	383	292	M - 32.2 H - 14.6	No 1.5 miles	M - 78.1	Important wildlife migration through this area for large mammals and forest carnivores, quality sage grouse habitat and lekking areas	M - 2.2	M - 5.4 H - 2.9	8	5	Corridor utilized; public lands designated utility corridor for existing 230kV line, but less preferred by agencies than the 1-15 corridor		Obstruction to glide path for Dell Airport; crosses 3 miles of conservation easement at the mouth of Medicine Lodge Creek; visual impacts to Big Sheep Backcountry Byway		29	Strong preference against this route by the resource agencies	Least overall impact between Mill Creek and State Line; least impact to water resources; lowest soil erosion hazard; crosses Class A scenery on Big Hole River
	Alternative B3 I-15 Route	11-3,16-1,16-3,16-4	88.3	105.4*	390	359	M - 35.0 H - 12.7	Yes	M - 70.9 H - 7.2	Within I-15 corridor which will reduce concern for wildlife movement corridors; waterfowl production area north of Clark Canyon Reservoir on Beaverhead River, quality sage grouse habitat and lekking areas	M - 27.1	M - 10.8 H 3.6	11	3	Corridor preference of agencies; I-15 helps establish this corridor as already impacted; agricultural land and visual impacts in Red Rock Creek valley	Subdivsion crossed at Apex and Lima	Crosses fishing access site on Link 16-1; crosses 3 miles of conservation easement at the mouth of Medicine Lodge Creek; crosses pivot irrigation in Red Rock Creek valley	H - 0.6	14	Concern about impacts in Red Rock Creek valley	Crosses Class A scenery on Big Hole River
	Alternative AB1 Jefferson Valley I-15 Route	1,3-1,7-2,7-41,7-42,7-5,7-8,11-22,11-21,7-9,8,16-1,16-2,16-4	209.2	200.4*	925	866	M - 110.1 H - 37.4	No 5.5 miles	M - 167.1 H - 12.2	Very high- and low-priority migration corridors crossed; waterfowl production at Missouri River crossing, big game winter habitat, quality sage grouse habitat and lekking areas	M - 78.8	M - 22.1 H - 5.3	99.0	26	There are no existing lines in the Jefferson Valley and there are no designated utility corridors.			H - 3.7	41	Public concern for establishing new corridor where none currently exist	Most miles of new line not parallel to other existing lines. This route would parallel the least miles of designated corridor or existing transmission line of any of the routes considered in Montana. This route would also require the addition of a switching station not required by any other alternative.

Note: The Townsend to Mill Creek alternatives must be combined with the Mill Creek to State Line alternatives to make complete Montana routes for comparison to the Jefferson Valley I-15 route. For example, the A1 and B1 alternatives are combined to form a complete Preferred Route for Montana.

*Line cost only (no station or right of way). Total for each alternative includes materials, construction labor and equipment. These costs are for comparison purposes.

The Alternative A1: Preferred Route and the A3: Maximize Corridors Route would have the highest impacts for wildlife movement corridors found in the Tobacco Route Mountain area along the existing 161kV and 230kV transmission line corridor. The A2: Parallel Colstrip Route would have the least impact to wildlife movement corridors, as no important movement occurs across this portion of the Beaverhead Deerlodge National Forest. However, this route would be the worst for impacts to winter range for deer and moose, and for summer elk, and would cause the only significant removal of forest habitat of any of the alternative routes considered, which would be considered classic habitat fragmentation. The A3: Maximize Utility Corridor route would result in the worst impact of the alternatives considered for elk winter range, but least impact to waterfowl production.

As a result of comparing the impacts and issues, NorthWestern selected the A1: Preferred Route between Townsend and Mill Creek (Melrose).

Mill Creek (Melrose) to State Line

The B2: Sheep Creek Route would have more miles of significant visual impacts than either B1: the Preferred Route or the B3: I-15 Route. The types of impacts are different however, because much of the Sheep Creek impacts are due to close proximity of the route to the Henneberry Ridge WSA and the route paralleling the Big Sheep Creek Backcountry Byway through the Medicine Lodge valley. In fact, the B2: Sheep Creek Route would cross the Backcountry Byway multiple times while parallel to the existing 230kV line.

This route would also impact the Lewis and Clark National Historic Trail at the mouth of the Medicine Lodge Creek near Horse Prairie. The B1: Preferred Route and the B3: I-15 Route would cross the Lewis and Clark National Historic Trail near Pipe Organ Rock at the crossing of the Beaverhead River. All three of the routes compared here would cross the Maiden Rock Fishing Access Site (FAS) on the Big Hole River, located north of Melrose. This FAS has received Land and Water Conservation funding. A conversion of LWCF lands to right of way could only be accomplished by providing mitigation lands or avoiding the site.

Visual impacts from residences and to scenery are a bigger issue on the B1: Preferred Route and on the B3: I-15 Route. The B3: I-15 Route would have the least overall visual impacts of the three routes compared from Mill Creek (Melrose) to State Line. The visual impacts to Lima by the B3: I-15 Route are also worthy of note here. Furthermore, the Big Sheep Creek Backcountry Byway is also crossed near Dell by the B3: I-15 Route.

All of the three alternative routes would cross waterfowl production areas of the Missouri River at the river crossings southeast and south of the Townsend Substation. Each alternative would cross the river once. All alternatives likewise cross through an area of Class A scenery at the crossing of the Big Hole River north of Melrose, and would also cross the Continental Divide National Scenic Trail at the Montana–Idaho border. Both the B1: Preferred Route and the B3: I-15 Route would cross the Ney Ranch Recreation Site managed by the BLM northeast of the Clark Canyon Reservoir and adjacent to Beaverhead River. The site is managed for cultural resources and recreation, and a reroute to avoid the ranch may mitigate the direct impacts.

The Preferred Route and the B3: I-15 Route would have impacts from the crossing of a conservation easement near Pipe Organ Rock. The B2: Sheep Creek Route would cross a conservation easement at the Mouth of Medicine Lodge Creek east of Clark Canyon Reservoir. The B3: I-15 Route would have direct conflicts with the airspace of the Dell Airport and would further conflict with center-pivot irrigation in the Red Rock River valley north and south of Dell.

A platted subdivision, currently under construction, would be crossed by the B1: Preferred Route and the B3: I-15 Route west of Glen. BLM and several other agencies have expressed a strong preference for following the I-15 from north to south through Montana and into Idaho, and both of these routes would fit this general routing preference.

The B2: Sheep Creek Route would be the worst of the Mill Creek to State Line alternative routes for impacts to sage grouse and also has the most known occurrences of special status plants. Further, this route has important wildlife movement corridors that are of the highest level of concern by the BLM and the wildlife management agencies.

The B1: Preferred Route would be the worst of the three alternatives for impacts to mule deer and pronghorn winter range, but the B2: Sheep Creek Route is worst for summer elk range. The B1: Preferred Route is worse than the B3: I-15 Route for mule deer winter range because the animals tend to stay on the bench on the east of the Red Rock River valley, with fewer that actually winter in the valley close to I-15 and the developed agricultural lands. The B1: Preferred Route and the B3: I-15 Route would both cross important waterfowl production areas of Red Rock River and upper Beaverhead River areas.

Because the agencies strongly prefer one of the two routes that utilize the I-15 corridor, NorthWestern selected the B1: Preferred Route because it would minimize impacts to the agricultural resources in the Red Rock River valley, the visual impacts to Dell and Lima, and expected designation of a utility corridor on public lands managed by the BLM through the agency's Westwide Corridor Programmatic EIS.

Townsend to Pipestone/Mill Creek to State Line Route

The AB1: I-15 Jefferson Valley Route is compared to a combination of the Townsend to Mill Creek Segments and the Mill Creek to State Line segments.

This route would cross the Big Hole River northeast of Dillon in a remote area, which would be preferred to the crossing of the Big Hole north of Melrose by all of the other alternative routes coming south from Mill Creek. The route from Pipestone to the Dillon area that makes this route different than the combination of the A1: Preferred Route and the B1: Preferred Route would result in stronger visual contrast through the Jefferson River valley because it would not be parallel to any linear features or transmission lines.

It would have a higher wildlife impact that the combination of the A1 and B1 Preferred Routes. The Jefferson River valley would have impacts from summer elk range and winter range for pronghorn, mule deer and elk. The Big Hole crossing is a Class I fishery.

When comparing the combined A1: Preferred Route and B1: Preferred Route with the AB1: I-15 Jefferson Valley Route, the combined Preferred Route A1 and B1 has fewer impacts and is more publicly acceptable, the final decision point was use of existing corridor versus constructing a new corridor through the Jefferson River valley.

NorthWestern's Preferred Alternative

NorthWestern considered the environmental and land use impacts of the various alternative routes, in addition to listening to the public and agencies during the public outreach and agency coordination that was done since April 2007. The consensus-building route selection process conducted in May 2008 compared impacts and public/agency issues and concerns. Environmental impacts are lower for the B3: Sheep Creek Route than the B1: Preferred Route, but the strong preference by the agencies was considered heavily in NorthWestern's selection of the Preferred Route.

The Preferred Route from the proposed Townsend Substation to Mill Creek to the Montana – Idaho border is a combination of A1: Preferred Route between Townsend and Mill Creek, and B1: Preferred Route between Mill Creek and the Montana – Idaho border (refer to Figure 2-15). This route is the best balance between public and agency acceptability, impact, and engineering feasibility determined by NorthWestern.

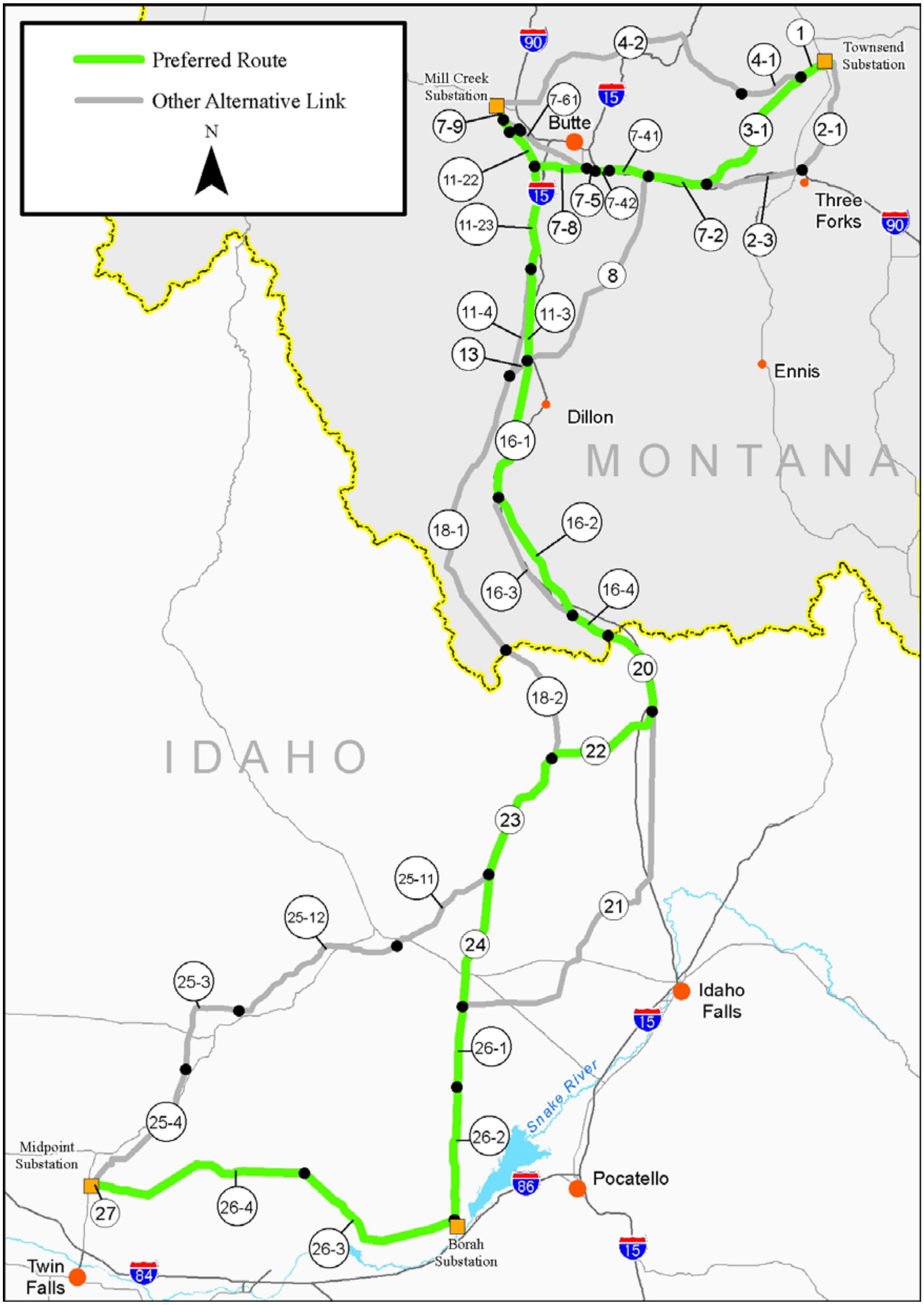

Figure 2-15 Preferred Route